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MEXICO

Assessing the readiness of artificial
intelligence

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An open, diverse, and transparent call was made to form discussion panels with experts in the areas covered by the RAM. There were 18 multi-stakeholder panels organized into six thematic areas, which included legislators, representatives of the federal and state governments, autonomous bodies, academia, experts, businesses and business associations, as well as civil society organizations.

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This report is the result of the technical support that ANIA requested from UNESCO starting in June 2023 to conduct a diagnosis of the development of AI in Mexico. This will identify the needs in terms of policies, regulations, and ethical standards, as well as the design of AI governance schemes in the country, based on UNESCO's "Recommendation on the Ethics of Artificial Intelligence."

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Acronyms and abbreviations

ANIA	National Alliance on Artificial Intelligence
ANR	National Risk Agenda
ANUIES	National Association of Universities and Higher Education Institutions
APF	Federal Public Administration
BOW	ARCO Rights: access, rectification, cancellation and opposition of personal data
CEIAP	Center for Studies and Research in Public Affairs.
CENAPRED	National Center for Disaster Prevention
CENIA	National Center for Artificial Intelligence (Chile)
CERT-MX	National Cyber Incident Response Center
CITICSI	Intersecretarial Commission on Information and Communication Technologies and Information Security
CNDH	National Human Rights Commission
COFECE	Federal Economic Competition Commission
CPEUM	Political Constitution of the United Mexican States
DOF	Official Gazette of the Federation
ENDUTIH	National Survey on Availability and Use of Information Technologies in Households
ENOE	National Survey of Occupation and Employment
GEALC	Latin American and Caribbean e-Government Network
R&D	Research and development
AI	Artificial intelligence
IAG	Generative artificial intelligence
IFT	Federal Telecommunications Institute
ILIA	Latin American AI Index
IMCO	Mexican Institute of Competitiveness
IMPI	Mexican Institute of Industrial Property
INAH	National Institute of Anthropology and History
INAI	National Institute for Transparency, Access to Information and Protection of Personal Data
INALI	National Institute of Indigenous Languages

INDAUTOR	National Institute of Copyright
INEGI	National Institute of Statistics and Geography
INMUJERES	National Institute of Women
INPI	National Institute of Indigenous Peoples
ISO	International Organization for Standardization
LFPDPPP	Federal Law on the Protection of Personal Data Held by Private Parties
LFPEd	Federal Law to Prevent and Eliminate Discrimination
LFTR	Federal Telecommunications and Broadcasting Law
LGAMVLV	General Law on Women's Access to a Life Free of Violence
LGDNNA	General Law on the Rights of Girls, Boys and Adolescents
LGMHCTI	General Law on Humanities, Sciences, Technologies and Innovation
LGPDPPO	General Law on the Protection of Personal Data Held by Obligated Subjects
LGBTIQ	General Law on Transparency and Access to Public Information
LRITF	Law to Regulate Financial Technology Institutions
SMEs	Micro, small and medium-sized enterprises
OECD, OECD	Organization for Economic Cooperation and Development
UN	United Nations Organization
PISA	Programme for International Student Assessment, of the OECD, a test of the same name
PROFECO	Federal Consumer Protection Agency
SCJN	Supreme Court of Justice of the Nation
SEP	Ministry of Public Education
SFP	Secretariat of Public Service
STEM	Acronym in English to designate the disciplines of science, technology, engineering and mathematics
TIC	Information and communication technologies
ITU/ITU	International Telecommunication Union
UNESCO	United Nations Educational, Scientific and Cultural Organization

Prologue



We have officially entered the era of Artificial Intelligence. The world is about to change at a pace not seen in decades, even centuries. AI-based tools and applications abound in our environment. They help us make routes more efficient, obtain information, pay taxes, and even obtain credit and/or jobs.

However, in its current form, AI reproduces and amplifies many of the societal challenges we face. About a third of the world's population still lacks adequate internet access. On the one hand, the AI industry is highly concentrated, in just two countries (the United States and China) and a dozen companies that account for a significant share of the sector. This can only lead to greater inequality of outcomes—including gender disparities—on the other side of the coin. In diverse AI teams, unrepresentative datasets, and opaque and biased algorithms can cause harm, especially to already vulnerable population groups.

For these reasons, UNESCO drafted the Recommendation on the Ethics of Artificial Intelligence, which was adopted in 2021 by 193 countries to ensure that AI delivers fair, sustainable, and inclusive outcomes. The Recommendation is based on the protection and promotion of human rights, human dignity, and sustainability, and these values are translated into principles such as accountability, transparency, and privacy. The Recommendation also sets out concrete policy actions that governments can rely on to guide technological development in a responsible direction, based on the belief that current regulation is insufficient. We need capable governments that are well equipped—in terms of powers, institutions, and laws—to ensure the responsible development of AI and protect the rule of law in the digital sphere; and, on the other hand, we need public and private developers to put human rights and fundamental freedoms first, not profit or geopolitical considerations.

The Readiness Assessment Methodology (RAM) is a diagnostic tool intended to assist Member States in fulfilling their commitment to the Recommendation by helping them understand their readiness to implement AI ethically and responsibly for their citizens. By highlighting any institutional, regulatory, or data gaps or obstacles, it enables UNESCO to tailor support to governments to address these gaps and ensure an ethical AI ecosystem aligned with the Recommendation.

As is the case with other nations, Mexico faces enormous challenges in achieving the ethical development of AI. The Mexican government began actively participating in international forums on these issues in 2018, when it launched an initiative to develop a national digital strategy that explicitly considered AI. It served on working groups at the UN and led several initiatives within the Latin American and Caribbean Network for the Development of Digital Governments. However, since then, other countries with similar levels of development have made significant progress, while Mexico has retreated from its leadership positions in this area.

One of the international initiatives supported by UNESCO to compare the situations of countries in the region is the Latin American AI Index, whose 2023 edition mentions a "very low" level of vision and institutionality in Mexico (with a score of 2.78 compared to the LATAM average of 33.68) and in strategy (8.33, when the LATAM average is 35.41), highlighting the fact that the country does not have a current AI strategy and has not implemented mechanisms with social participation to advance in this area.

In contrast, Mexico is in a good position regarding privacy, data transparency, and access to information, thanks to a solid regulatory and institutional framework coordinated by the National Institute for Transparency, Access to Information, and Protection of Personal Data, an autonomous constitutional body. The country is also characterized by a legal framework that protects due process rights from a human rights perspective. However, one of the major challenges remains the lack of access to justice for low-income people and historically discriminated groups.

According to data published by UNESCO in 2021, Mexico's position in education and science has been changing.

Internet access in primary schools for educational purposes reached 29%, while in secondary and high schools it was 54% and 44% respectively. Regarding the availability of computers for educational purposes, access in primary schools was 47%, in secondary schools 83%, and in high schools 70%. However, the country's educational attainment levels remain relatively low and therefore remain one of the country's greatest challenges: in the last 20 years, the average schooling only increased from 7.5 to 9.7 years. Regarding STEM graduates by 2023, only 32% were women compared to 68% men, so the challenges to reducing this gap remain significant.

In terms of innovation, Mexico leads Latin America in public investment in research and development when total amounts are considered. However, per capita investment lags behind the regional average, and public spending on ICT has decreased significantly in recent years. Regarding infrastructure, in December 2022, there were 93 mobile lines with internet service and 106 mobile lines with telephone service per 100 inhabitants, with 93.3% of the population receiving at least 3G mobile coverage.

In terms of internet users, ENDUTIH estimated that in 2022 this number would rise to 93.1 million in Mexico, representing 78% of the population aged 6 years and older, an increase of 3.0 percentage points compared to 2021. Regarding the gender gap, the Inclusive Internet Index reports a gap of 20.8 percentage points in internet access, which places the country in 77th place out of 100 in terms of equal access.

Overall, this report presents a fundamentally optimistic view that we share at UNESCO: that ethical governance and responsible regulation of AI are fully consistent with innovation and economic growth, and are essential to ensuring a technological ecosystem that benefits the public good. With the RAM data and this report, Mexico has a clear roadmap to achieve this.

It was a pleasure working with the National Artificial Intelligence Alliance (ANIA) and all its members to carry out this exercise. We appreciate their commitment to the AMR, and I am confident that, by following the path outlined in this report, Mexico will be able to reap the benefits of AI while ensuring that AI technologies deliver fair, sustainable, and inclusive outcomes.

Gabriela Ramos

Assistant Director-General for Social and Human Sciences, UNESCO

Executive summary

In 2018, the Mexican government launched an initiative to develop a national digital strategy that considered Artificial Intelligence (AI)¹ and immediately took an active role in the international debate on the matter, participating in the formation of working groups at the UN and leading initiatives in the Latin American and Caribbean Network for the Development of Digital Governments. It participated in global forums focused on science, technology, and innovation, and that same year supported a UN resolution urging countries to analyze the impact of technological advances, with special emphasis on AI. However, despite the initial momentum and the fact that some state governments have promoted local plans, today there is no national digital plan or strategy in Mexico, let alone one for artificial intelligence.

This situation is reflected in various international assessments. For example, the Latin American AI2 Index², published in 2023 by a broad consortium of international institutions such as UNESCO, with the support of a group of Chilean universities and educational centers, highlights Mexico's "very low" level in vision and institutionality (with a score of 2.78 compared to the LATAM average of 33.68) and in the strategy indicator (8.33 when the LATAM average is 35.41), mainly due to the lack of a current AI strategy and the failure to consider mechanisms for public participation. It is important to recognize that the challenge facing the country is significant, especially in light of the speed with which the digital ecosystem is evolving.

One of the immediate challenges is to build a governance environment conducive to the development and use of AI. Mexico can rely on various institutions, such as the autonomous entities Federal Telecommunications Institute (IFT) and the National Institute for Transparency, Access to Information, and Protection of Personal Data (INAI), which have powers that can be leveraged for this purpose. There are also standards that adhere to international human rights instruments, as well as laws and regulations that indirectly regulate aspects related to AI, such as non-discrimination, personal data protection, and access to technology.

Regarding privacy, data transparency, and access to information, the outlook is more positive, as there is a regulatory and institutional framework coordinated by the INAI (National Institute of Information and Communications), as an autonomous constitutional body that guarantees compliance with two fundamental rights: the right to access public information and the protection of personal data. This guarantees that any federal authority, autonomous bodies, political parties, trusts, public funds, and unions, or any individual or legal entity that receives and uses public resources or performs acts of authority, must provide public information requested by individuals, and that open data and open government standards are adopted. It also guarantees the protection and appropriate use of personal data, as well as the exercise and protection of the rights of access, rectification, erasure, and objection that every individual has with respect to their information.

According to the Center for Law and Democracy's Global Right to Access to Information Index, Mexico ranks second out of 138 countries with a score of 136/150, reflecting the strengthening of the legal framework for the right to know. However, in practice, the implementation of open government or open data has not yet been realized in Mexico.

The country has a solid legal framework that protects due process rights from a human rights perspective.

However, its implementation poses challenges, such as a lack of access to justice for low-income people and historically discriminated groups.

¹ Artificial Intelligence (AI) is a field of research that encompasses a wide range of subdisciplines, methodologies, and developments, including machine learning, deep learning, natural language processing, computer vision, robotics, expert systems, and other related approaches. However, the term "Artificial Intelligence" is commonly used to refer to computational systems designed to perform tasks that typically require human intelligence, such as learning, reasoning, problem-solving, perception, and natural language understanding. In this document, the term is intentionally used in the broadest sense possible to refer to both research fields and related methodologies, as well as specific systems and their implementations.

² National Center for Artificial Intelligence (2023). Latin American Artificial Intelligence Index. <https://indicelatam.cl>

The Supreme Court of Justice of the Nation has ruled that hate speech is not protected by freedom of expression. However, there are no legal mechanisms for reporting, suspending, or removing hate speech, misinformation, or disinformation, except when it is broadcast on radio or television, and even then, the mechanisms have not been effective.

In the fields of education and science, some light and shade are observed. The integration of technology into education has been advancing. According to 2021 UNESCO data, internet access in primary schools for pedagogical use reached 29%, while in secondary and high schools it was 54% and 44% respectively. Regarding computers for pedagogical purposes, access in primary schools was 47%, in secondary schools 83%, and in high schools 70%. However, schooling levels remain low: in the last 20 years, the average schooling only increased from 7.5 to 9.7 years. And of the STEM graduates in 2023, only 32% were women versus 68% men, so this gap is still very large.

Scientific production in AI is low compared to international standards, although the country has begun to incorporate digital technologies into the education sector and is seeing increases in the number of graduates from AI postgraduate programs. However, there is no national strategy to adapt to the rapid changes we are seeing in education and the labor market.

In terms of innovation, Mexico shows a mixed performance. Although it leads Latin America in Investment and Development (R&D), the per capita amount lags behind the regional average, and public spending on ICT has declined significantly in recent years. Regarding venture capital invested in artificial intelligence, it was \$266 million in 2022 and \$150 million by September 2023.

The Mexican Constitution establishes the principle of gender parity, which applies to the executive and legislative branches of government, to autonomous bodies, and to the nomination of candidates for elected office. This has led to an increasing number of female legislators and public servants working on issues related to science and AI, although parity has not been achieved in all public entities and, where it has been, it has not permeated all hierarchical levels or all sectors. Socioeconomic inequalities are still very wide, and gender gaps continue to show significant lags. Hence the importance of including ethical principles in the development of AI so that it does not widen existing inequalities and gaps.

Regarding cultural diversity, Mexico's law does not stipulate an official language, although Spanish is certainly the predominant language by far. The country is home to a rich linguistic diversity with 68 recognized indigenous languages, which face significant challenges such as a small number of speakers and a very limited presence in the digital realm. This poses a challenge for generating artificial intelligence training data that reflects the country's cultural and linguistic diversity.

Regarding cybersecurity, Mexico approved the Council of Europe's Budapest Convention on Cybersecurity in 2014, although the Senate had not ratified it as of this writing. The fact is that there is still no national strategy or approved legislation on the matter.

In the area of infrastructure, there has been progress. As of December 2022, the IFT reported that there were 93 mobile lines with internet service and 106 mobile lines with telephone service per 100 inhabitants. The same agency indicates that 93.3% of the population has coverage from at least one 3G mobile network.

Regarding internet speed, Ookla's Q2 2023 report indicated that the average fixed broadband download speed in Mexico was 60.71 Mbps, an increase of approximately 30.7% compared to the same period in 2022. However, this figure is still lower than the OECD average of 119 Mbps.

In terms of internet users, the National Survey on the Availability and Use of Information Technologies in Households (ENDUTIH), published by INEGI, estimated that in 2022 there were 93.1 million internet users in Mexico, representing 78% of the population aged 6 years and older, an increase of 3.0 percentage points compared to 2021. Regarding the gender gap, the Inclusive Internet Index reports a gender gap of 20.8 percentage points in internet access, which places the country in 77th place out of 100 in equal access.

Based on this diagnosis, understanding Mexico's strengths and challenges in AI, a list of policy recommendations was compiled, from which four fundamental components emerge: 1) the development of a functional map of the ecosystem in which artificial intelligence lives and impacts; 2) the integration of a legal framework for AI that starts from the consideration of existing applicable regulations, to adapt or create what is necessary, innovating in regulatory forms; 3) create the institutional and governance design for AI that responds to the objectives and needs of public policies and regulations in this area and that involves different levels of government, academia, industry, and civil society in its decisions; and 4) issue the National Artificial Intelligence Strategy, considering cybersecurity, an inclusive ethical and human-

central, taking into account its environmental sustainability, the attention to new educational and employment demands, as well as the need to boost infrastructure.

Although the initial momentum toward a national digital agenda and the development of a strategy to address the challenges of AI has slowed in recent years, the country has strengths in its current legal framework, in the protection of human rights in the Constitution, in its achievements in privacy and data protection, in the resilience of its autonomous bodies, in its national information and statistics system, and in the impetus shown by many actors from academia, civil society organizations, local government agencies, businesses, and the legislative branch to contribute to building a governance environment that ensures the ethical development of AI.

GENERAL DIAGNOSIS

The public AI agenda in Mexico has been around for several years. In its initial stages, the country was a pioneer in Latin America, although it has subsequently gone through various periods in which its initial momentum has been lost. Below is a summary of this history :

1. In 2018, the Mexican government, through the Coordination of the National Digital Strategy, launched an initiative to develop a national AI strategy, which resulted in a list of public policy recommendations in a report entitled "Towards an artificial intelligence strategy in Mexico: Taking advantage of the AI revolution"⁴
2. In June 2018, Japan and Mexico led the third UN forum on science, technology, and innovation for achieving the Sustainable Development Goals (SDGs). The Mexican delegation presented what would be adopted as resolution 73/17, which urged member countries to continue examining the impact of rapid and fundamental technological changes, with particular reference to artificial intelligence.
3. By then, the government had already developed two additional documents on the general principles of AI and a risk assessment tool for the development and use of autonomous systems by government agencies.
4. At the international level, Mexico had taken the initiative to form a working group at the UN and led the Working Group on Emerging Technologies in the Latin American and Caribbean Network for the Development of Digital Governments (GEALC).
5. A national coalition of stakeholders from industry, academia and civil society, called [IA2030.mx](https://www.ia2030.mx), was launched, with the goal of coordinating efforts, building a unified voice around AI, and promoting ongoing action and support for the issue. This coalition created the first National AI Agenda based on the collective intelligence of more than 400 people.
6. Mexico is part of the Global Partnership on Artificial Intelligence (GPAI)⁵, initiative launched in June 2020.
7. Mexico approved the Recommendation on the Ethics of Artificial Intelligence during the UNESCO General Conference on November 23, 2021.

Despite the track record described in the preceding paragraphs, there is currently no concrete plan or strategy for artificial intelligence in Mexico, let alone an instrument to guide its ethical adoption. Nor is there sufficient clarity regarding the attribution of responsibilities among authorities regarding AI, although there is a constitutional and legal framework for the application of various principles related to ethics in this area, such as the protection of personal data, equality and non-discrimination, the right to access information and communications technologies, and the right to live a life free from violence. However, in the absence of a national AI plan, the necessary mechanisms to make these principles a reality do not exist in practice.

³ This account is based on Apolitical (2020). Mexico: The History and Lessons Behind Latin America's First AI Strategy. <https://apolitical.co/solution-articles/es/mexico-la-historia-y-las-lecciones-detras-de-la-primera-estrategia-ai-de-america-latina>

⁴ The preparatory study was carried out in collaboration with the organizations CMinds and Oxford Insights: Towards an artificial intelligence strategy in Mexico: Taking advantage of the AI revolution, 2018. <https://www.ia2030.mx/agenda2020>

⁵ Global Partnership on Artificial Intelligence. <https://www.gpai.ai/community/>

Many countries around the world find themselves in similar situations, as illustrated, for example, by the Government AI Readiness Index, which assigned Mexico a score of 49.28 in the governance pillar, placing it in 52nd place globally. However, it should be noted that other Latin American countries perform better in this area, such as Uruguay (63.84), Colombia (61.77), and Chile (53.99).⁶

⁶ Oxford Insights (2017). Government AI Readiness Index 2017. <https://www.oxfordinsights.com/government-ai-readiness-index>

LEGAL AND REGULATORY DIMENSION

This first section of the assessment addresses the elements of the legal framework that can be leveraged in its application to artificial intelligence, and the challenges Mexico faces in modifying its legal and regulatory architecture regarding cybersecurity, privacy and open data protection, access to information and transparency, due process, accountability, online security, integrity of speech, and public sector capabilities.

Although there is no regulatory authority for AI, there are various public entities empowered to influence AI governance:

- The National Digital Strategy Coordination Office of the Presidency of the Republic. This office is responsible for developing and monitoring the National Digital Strategy.
- The Intersecretarial Commission on Information and Communication Technologies and Information Security (CITICSI), which brings together officials responsible for implementation and technology in federal public administration agencies. This commission is responsible for coordinating actions and regulations for the use of AI within the executive branch.
- The IFT, as an autonomous authority, has the power to issue regulations or recommendations provided they do not conflict with current law. As a telecommunications regulator and competition authority, it also has influence and technical expertise in areas relevant to AI.
- The INAI, as an autonomous authority, has the power to issue regulations on the use and protection of personal data.
- The Standardizing Authorities are the competent entities of the Federal Public Administration that have express powers or faculties to carry out standardization and normalization activities. Therefore, they are responsible for the development and issuance of Mexican Official Standards (NOM) and technical standards, in accordance with the processes established in the Quality Infrastructure Law.
- The President of the Republic is responsible for regulating the laws issued by the Congress of the Union.

Some of the current challenges are due to a broader lag in the country's digitalization and, in particular, in public policy in this matter.

The National Digital Strategy 2021-2024⁸, in fact, it does not contemplate a digitalization or digital transformation plan for the country, but rather brings together guidelines for austerity and the use of IT equipment within the APF. It establishes basic axes such as the digitalization of the federal public administration and an internet coverage policy, but does not include any AI topics. And, according to a 2022 report, 20 of the country's 32 states do not have a state digital policy.

This situation is reflected in various international assessments. For example, the Latin American AI Index highlights Mexico's "very low" level of institutionality (2.78/100) and strategy (8.33/100), mainly due to its lack of a current AI strategy and its failure to consider mechanisms for public participation.

⁷ Quality Infrastructure Law. https://www.diputados.gob.mx/LeyesBiblio/pdf/LICal_010720.pdf

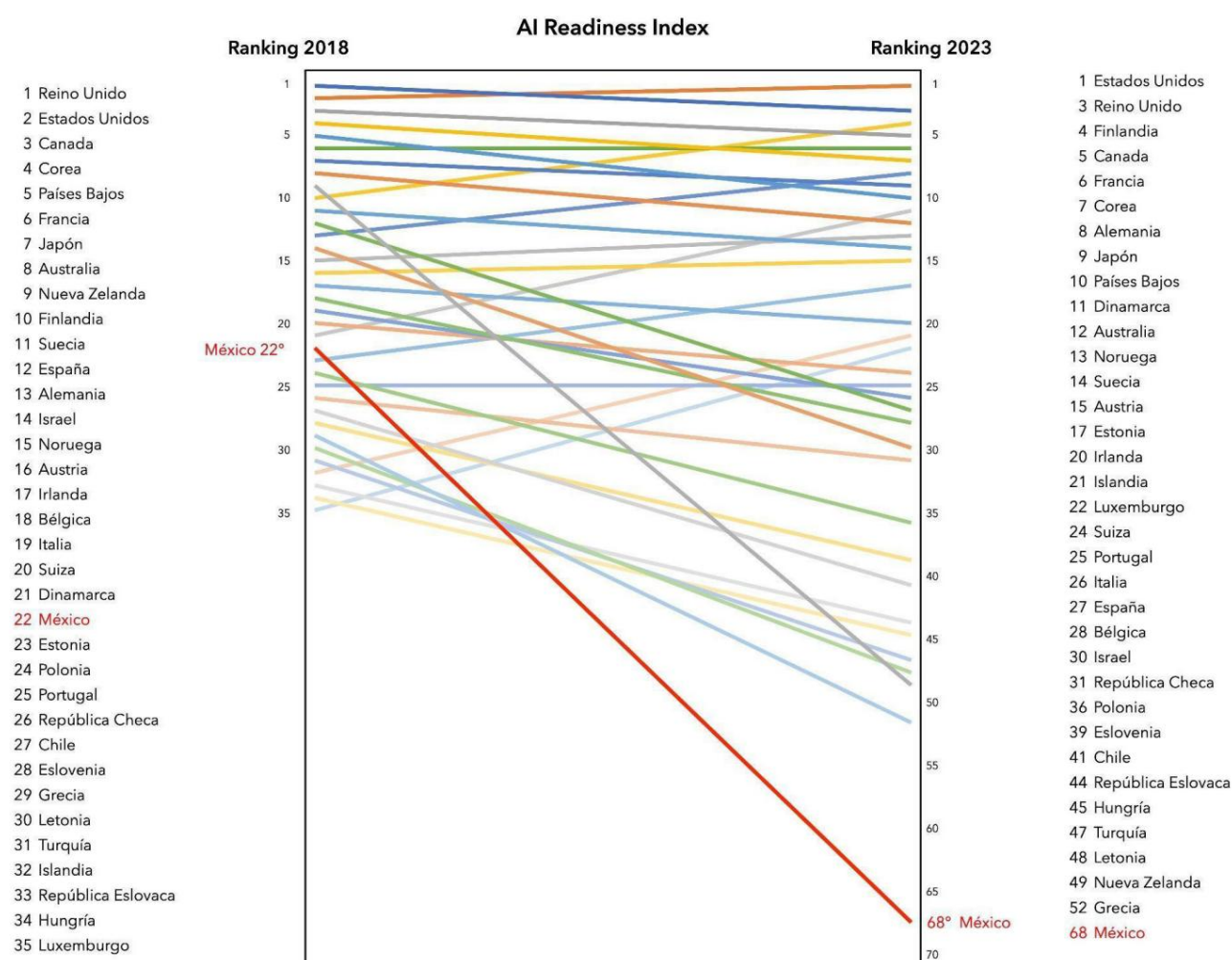
⁸ Coordination of the National Digital Strategy (2021), National Digital Strategy 2021-2024. Published in the Official Gazette of the Federation (DOF) on 06/09/2021. https://dof.gob.mx/nota_detalle.php?codigo=5628886&fecha=06/09/2021

⁹ CEIAP (2022). Evolution of State Digital Policy. <https://www.ceiap.mx/evaluacion-de-la-politica-digital-estatal-2022/>

¹⁰ National Center for Artificial Intelligence (2023). Latin American Artificial Intelligence Index. <https://indichelatam.cl>

The Government AI Readiness Index¹¹ was first published in 2017, including only OECD countries. That year, Mexico ranked 22nd out of 35 countries, ahead of Estonia, Poland, Portugal, the Czech Republic, Chile, Slovenia, Greece, Latvia, Turkey, Iceland, the Slovak Republic, Hungary, and Luxembourg. As shown in Figure 1, in the most recent assessment, from 2023, all of these countries surpassed Mexico and now exceed it by up to 20 points in the total score. In this edition, Mexico is ranked 68th (out of 193 countries) with a total score of 50.37. As a regional reference, the scores were 63.7 for Brazil, 61.95 for Chile, 57.85 for Colombia, and 57.72 for Argentina. In Mexico, the Government pillar scored 43.08, the Technology pillar scored 39.55, and the Infrastructure and Data pillar scored 68.49.

Figure 1. Changes in country scores on the Government AI Readiness Index from 2018 to 2023



Source: Prepared by the authors using data from the Government AI Readiness Index.

The low score in the governance pillar highlights specific weaknesses in the areas included within this pillar: having a strategic vision for developing and managing AI; considering appropriate regulation with ethical principles that build trust and legitimacy; and internal digital capabilities to innovate and adapt to new digital technologies.

¹¹ Oxford Insights (2017). Government AI Readiness Index 2017. The index is calculated based on three pillars, each comprising a set of factors: the government pillar, the technology pillar, and the infrastructure and data pillar. <https://www.oxfordinsights.com/government-ai-readiness-index>

AI PUBLIC POLICY AND REGULATION

Mexico has regulations that have an indirect impact on AI regulation:

- There are principles of non-discrimination in the Political Constitution of the United Mexican States (CPEUM)¹² and in laws on different subjects.
- The Federal Law on the Protection of Personal Data Held by Private Parties (LFPDPPP)¹³ establishes principles and standards for the protection of personal data, which are also applicable to data used in AI systems.
- The Federal Law to Prevent and Eliminate Discrimination (LFPED)¹⁴ also establishes principles of non-discrimination that are applicable to AI.

There are also international instruments for the protection of human rights, which are part of the regulatory framework applicable in the country, pursuant to Article 133 of the Constitution. According to the Supreme Court of Justice of the Nation, international treaties are part of the legal framework and are placed above federal and local laws.

Within this framework is the Universal Declaration of Human Rights, approved by the United Nations General Assembly (UN) in 1948, which protects privacy and one's image (Art. 12), prohibits arbitrary interference in privacy, family, home and correspondence, as well as attacks on honor and reputation.

There is also the International Covenant on Civil and Political Rights, which reflects Article 12 of the Universal Declaration, and the American Convention on Human Rights, which addresses the same aspects in the section on the Protection of Honor and Dignity.

Regarding initiatives to amend or enact new laws related to AI, several were introduced in both the House of Representatives and the Senate in 2023. Some introduce new concepts into ordinary laws, explicitly mentioning AI, and others seek to expand powers or assign new ones, but few refer to guiding principles or high-level objectives.

Topics covered include the processing of personal data; ethics in AI and robotics; security and ethics in healthcare; responsibility in the use of AI in news; regulation of research, development, and applications; teaching AI in higher education; the creation of an agency for its development; criminalization of sexual or digital violence created with AI; lewd content with real or generated victims; crime prevention; prosecution of crimes related to digital platforms with adult content; and oversight and supervision of responsibility and ethics in AI in telecommunications services.

On the other hand, there are no items specifically allocated to artificial intelligence in the federal budget, although some public entities have carried out activities related to the development or attention to this issue, and a decrease in public spending on digital technologies has been observed. A report by the consulting firm Social Intelligence Unit (SIU) indicates that while the demand for government services and procedures has increased, the federal government has decreased its spending on ICT equipment. In 2018, this item accounted for 0.69% of total programmable expenditure, and it will fall to 0.56% in 2023.

In 2021, the National Digital Strategy Coordination published the agreement issuing policies and provisions to promote the use and exploitation of information technology, digital government, information and communication technologies, and information security in the Federal Public Administration.¹⁷ AI is not explicitly mentioned, but the objective is to strengthen the use of free software and open standards, encourage the development of institutional applications for public use, and achieve technological autonomy, sovereignty, and independence within the Federal Public Administration.

On April 21, 2023, the National Artificial Intelligence Alliance (ANIA) was presented in the Senate of the Republic with the goal of strengthening the AI ecosystem in Mexico through an inclusive and interdisciplinary dialogue approach. This alliance seeks to influence the formulation of public policies, regulations, and governance models related to AI.

¹² Political Constitution of the United Mexican States. <https://www.diputados.gob.mx/LeyesBiblio/pdf/CPEUM.pdf>

¹³ Federal Law on the Protection of Personal Data Held by Private Parties. <https://www.diputados.gob.mx/LeyesBiblio/pdf/LFPDPPP.pdf>

¹⁴ Federal Law to Prevent and Eliminate Discrimination. <https://www.diputados.gob.mx/LeyesBiblio/pdf/LFPED.pdf>

¹⁵ The content of these initiatives is not detailed because, at the time of publication of this report, their future is uncertain. Some could be approved, with or without modifications, while others will be rejected. Furthermore, some have even been withdrawn by their proponents.

¹⁶ The SIU. Overview of the public budget for ICT in Mexico, 2023. <http://www.the-siu.net/wordpress/wp-content/uploads/2023/08/The%20SIU-Panorama%20Presupuesto%20TIC%20M%C3%A9xico%202023%20v05.pdf>

¹⁷ DOF 06/09/2021. Agreement issuing policies and provisions to promote the use and exploitation of information technology, digital government, information and communication technologies, and information security in the Federal Public Administration. https://dof.gob.mx/nota_detalle.php?codigo=5628885&fecha=06/09/2021#gsc.tab=0

For its part, the IFT announced a medium-term strategy called Roadmap 2021-2025, which proposes actions to address the emergence of technologies such as AI.¹⁸ Within strategy 3.2 of that document, the IFT contemplates promoting the adoption of new technologies and digital use cases in society, for which it proposes increasing knowledge of the advantages of using these technologies, increasing the level of training and capacity building in their use, coordinating support initiatives and promoting the use of innovative technologies such as cloud computing, big data and artificial intelligence.

PRIVACY AND DATA PROTECTION

In Mexico, privacy and respect for private life, intimacy, and the free development of personality are protected by the Constitution and various laws, such as the General Law on Women's Access to a Life Free of Violence (LGAMVLV)¹⁹ and the General Law on the Rights of Children and Adolescents (LGDNNA)²⁰. Article 1916 of the Federal Civil Code defines moral damage as: "The impact that a person suffers on their feelings, affections, beliefs, decorum, honor, reputation, private life..."²¹.

The INAI²² is the autonomous constitutional body that guarantees compliance with two fundamental rights: the right to access to public information and the right to personal data protection. Regarding the former, it guarantees that any federal authority, autonomous bodies, political parties, trusts, public funds, and unions, as well as individuals or legal entities that receive and use public resources or perform acts of authority, provide the public information requested by individuals. Regarding the latter, it guarantees the proper use of personal data, as well as the exercise and protection of the rights of access, rectification, erasure, and objection that every individual has with respect to their information. In addition, there are the guarantor bodies of the states of the Republic²³, which, together with the INAI, INEGI, the General Archive of the Nation, and the Superior Audit Office of the Federation, make up the National System of Transparency and Personal Data Protection, coordinated by the INAI.

Regarding data protection and privacy laws, according to the Global Cyber Security Index, Mexico achieves a score of 81.6424. This ranking reflects the actions the country has taken on the issue for several years, such as the LFPDPPP²⁵, which was enacted in 2010 and entered into force in 2011.

The LFPDPPP establishes the principles and procedures for the protection of data belonging to individuals or legal entities that are not public entities. These principles emphasize the legality, consent, and purpose of data processing; the accuracy of the data; who has the right to access this information; and also the principles for rectification, erasure, and even objection to the processing of their personal data. Similarly, this legislation establishes the procedure to guarantee the secure and responsible processing of data, through registration, notification of the processing that will be given to the data, and the rights of access, rectification, erasure, and objection (ARCO).

In addition to the LFPDPPP, Mexico also has the General Law on the Protection of Personal Data Held by Obligated Subjects (LGPDPSSO),²⁶ which was enacted in 2017 and entered into force in 2018. It establishes the principles and procedures for the protection of personal data held by obligated subjects, i.e., public bodies. The LGPDPSO stipulates that public bodies must have a Transparency and Access to Public Information Committee.

Regarding privacy protection, the INAI has issued several instruments, such as the Recommendations for the Processing of Personal Data Derived from the Use of Artificial Intelligence²⁷, to promote the appropriate and ethical use of personal information through the various technologies that utilize Artificial Intelligence. It has also published various instruments related to the processing of personal data on social networks.

18 IFT (2020). IFT Strategy 2021-2025. <https://www.ift.org.mx/sites/default/files/contenidogeneral/transparencia/estrategia20202025.pdf>

19 General Law on Women's Access to a Life Free from Violence. <https://www.diputados.gob.mx/LeyesBiblio/pdf/LGAMVLV.pdf>

20 General Law on the Rights of Girls, Boys, and Adolescents. <https://www.diputados.gob.mx/LeyesBiblio/pdf/LGDNNA.pdf>

21 Federal Civil Code. <https://www.diputados.gob.mx/LeyesBiblio/pdf/CCF.pdf>

22 National Institute for Transparency, Access to Information, and Protection of Personal Data. <https://home.inai.org.mx/>

23 SNT. Members. https://snt.org.mx/?page_id=453

24 International Telecommunication Union, Global Cyber Security Index. Latest 2021 edition consulted. <https://www.itu.int/epublications/publication/D-STR-GCI.01-2021-HTM-E>

25 Federal Law on the Protection of Personal Data Held by Private Parties. <https://www.diputados.gob.mx/LeyesBiblio/pdf/LFPDPPP.pdf>

26 General Law on the Protection of Personal Data Held by Obligated Subjects. <https://www.diputados.gob.mx/LeyesBiblio/pdf/LGPDPSO.pdf>

27 INAI. Recommendations for the processing of personal data derived from the use of artificial intelligence. <https://home.inai.org.mx/wp-content/documents/PublicoSectorDocuments/PDP-IARecommendations.pdf>

The INAI has also participated in the preparation of several documents of the Ibero-American Network for the Protection of Personal Data related to the use of artificial intelligence:

- General Recommendations for Data Processing in Artificial Intelligence²⁸.
- Specific Guidelines for Compliance with the Principles and Rights Governing the Protection of Personal Data in Artificial Intelligence Projects²⁹.

Likewise, in 2022, it published a report³⁰ on the evaluation of compliance with the LGPDPPSO. The report found that approximately 30% of the entities studied were in compliance with their transparency obligations.

While not a country-by-country report, in 2021 the OECD published a report on the implementation of the Council Recommendation on Guidelines Governing the Protection of Privacy and Transborder Flows of Personal Data. This report provides a comprehensive assessment of the data privacy features of OECD member countries' legislation, including Mexico. ³¹ The report notes that several countries were addressing, or planning to address, technological challenges by establishing new data governance frameworks (e.g., through additional rules on managing the availability, accessibility, usability, quality, interoperability, and ownership of data collected, processed, and stored), and that some countries had or were developing sector-specific data strategies, a national data strategy, or specific AI frameworks. Mexico is not mentioned among this group of countries.

The INAI has publicly stated the need to update the legal privacy framework in light of new technologies such as AI³².

The right of access allows users to request a copy of their personal data from those responsible for their personal data. The right to rectification allows users to request correction if the data is inaccurate or incomplete. The right to erasure refers to the deletion of their personal data, and the right to object provides the right to request that data controllers stop using their personal data.

The law also contemplates the principle of data minimization, which is to collect only what is strictly necessary for the intended purpose. It also establishes that the processing of personal data requires the data subject's consent, in the case of sensitive data, for purposes other than those originally contemplated and for processing by third parties. However, consent may be express or implied, and there are no specific obligations to ensure that this consent is meaningful (conscious, informed, with real alternatives). Similarly, the law indicates that data controllers must be transparent with data subjects regarding the processing of their personal data, the purposes, categories, and third parties to whom the data will be transferred, while also ensuring that they have the technical and security measures in place for data management.

The right to be forgotten is not protected in Mexico. The Supreme Court of Justice determined that this right is incompatible with the Mexican legal framework. ³³ The law also contemplates cases in which a privacy or data protection impact assessment (PIIA) is required:

- When it involves intensive or relevant processing of personal data.
- When the human rights of data subjects may be affected.
- When a significant impact may be caused on the daily lives of data subjects.

The law includes specific rules for sensitive information, such as health data, racial or ethnic origin, health status, sexual life, religion, philosophical beliefs, union membership, political opinions, sexual preference, or biometric data. Redress schemes are also provided. Data subjects have the right to seek compensation for damages in the event of a violation of their rights, although the burden of proof rests with the data subject. In other words, the affected party must prove the misuse of their data, which inhibits the exercise of this right. Since 2010, no major updates have been made to these laws to take into account technological changes, specifically those related to artificial intelligence.

²⁸ Ibero-American Data Protection Network (2020). General recommendations for data processing in artificial intelligence. <https://www.redipd.org/sites/default/files/2020-02/guia-recomendaciones-generales-tratamiento-datos-ia.pdf>

²⁹ Ibero-American Data Protection Network (2020). Specific guidelines for compliance with the principles and rights governing the protection of personal data in Artificial Intelligence projects. <https://www.redipd.org/sites/default/files/2020-02/guia-orientaciones-espec%C3%ADficas-proteccion-datos-ia.pdf>

³⁰ INAI (2022). Report on the evaluation of the performance of the obligated subjects in compliance with the provisions on Personal Data Protection 2022-2023. https://home.inai.org.mx/wp-content/documentos/pdp/estadisticas/evaluaciondesemp/informe_evaluacion_results_%202022-2023.pdf

³¹ OECD (2021). Report on the Implementation of the Recommendation of the Council Concerning Guidelines Governing the Protection of Privacy and Transborder Flows of Personal Data. [https://one.oecd.org/document/C\(2021\)42/en/pdf](https://one.oecd.org/document/C(2021)42/en/pdf)

³² INAI. INAI Comunicado/310/23. <https://home.inai.org.mx/wp-content/documentos/SalaDePrensa/Comunicados/Comunicado%20INAI-310-23.pdf>

³³ SCJN. Press Release No. 424/2022. <https://www.internet2.scjn.gob.mx/red2/comunicados/noticia.asp?id=7148>

Regarding data sharing, there is no general framework in the country, but rather specific sectoral provisions or data sharing agreements within international contexts, such as the collaboration between the United States and Mexico within the framework of the High-Level Security Dialogue³⁴ or the Entry/Exit Data Sharing Initiative between the United States and Mexico³⁵. Regarding the transfer of national and international personal data, the provisions of the LGPDPSO and the LFPDPPP apply.

Certain free trade agreements to which Mexico is a party include clauses relating to the cross-border flow of data in the field of electronic commerce or others such as the Trans-Pacific Partnership or the Agreement between Mexico, the United States and Canada (USMCA), which in Article 19.8 of Chapter 19 "Digital Trade" recognizes the CBPR System as a valid mechanism to facilitate cross-border transfers of information while protecting personal information, which leads the participating parties to implement privacy policies consistent with the framework of the "APEC Cross-Border Privacy Rules System."

At the time of writing this report, Mexico had not signed the update of the Convention for the Protection of Individuals with Regard to the Automated Processing of Personal Data, Convention 108, with the Council of Europe.

Model contractual clauses, such as the guide developed by the Ibero-American Data Protection Network (RIPD), are also used to establish the main aspects to be taken into account when carrying out international transfers of personal data. Likewise, participation in international organizations such as the OECD becomes an important parameter for establishing and maintaining solid international standards regarding personal data protection, thus promoting the trustworthy flow of data.

As an example of sector-specific provisions, there are the Law to Regulate Financial Technology Institutions (LRITF known as the "Fintech Law")³⁷ and associated administrative regulations³⁸, which regulate application programming interfaces ("APIs") to enable connectivity, access and sharing of certain data and, consequently, fintech institutions are subject to data sharing requirements.

OPEN DATA, ACCESS TO INFORMATION AND TRANSPARENCY

Mexico has the General Law on Transparency and Access to Public Information (LGTAIP), which establishes the right of every person to request and receive information from any government agency, entity, or organization under the principles of transparency, timeliness, and quality. Every public entity must have a mechanism for individuals to exercise their right to access public information, and this mechanism must be available online. Furthermore, if information is not provided, if access is denied, etc., the requester can file an appeal for review on the National Transparency Platform.

The effectiveness of the LGTAIP has been evaluated by several organizations. Overall, these evaluations have found that the LGTAIP has had a positive impact on the transparency of the Mexican government, although they have also identified some challenges, including resistance from some obligated entities to comply with the law, a lack of resources to do so, and a lack of awareness of the law among citizens. On the other hand, positive effects have been recorded, such as greater availability and easier access to public information, and the promotion of citizen participation in public decision-making.

Although it does not consider the existence of AI, the LGTAIP can be a means of requesting information about the use and operation of AI systems. This information may include how public entities use artificial intelligence systems, such as: the objectives of the AI systems; the training data used (while preserving privacy); the algorithms; the results and their use in decision-making. However, the LGTAIP also establishes that public information may be withheld in certain cases, for example, for reasons of national security or privacy.

³⁴ The White House (2021). Joint Statement: High-Level Security Dialogue between Mexico and the United States. <https://www.whitehouse.gov/briefing-room/statements-releases/2021/10/08/joint-statement-us-mexico-high-level-security-dialogue/>

³⁵ U.S. Department of Homeland Security. DHS/CBP/PIA-050 United States - Mexico Entry/Exit Data Sharing Initiative. <https://www.dhs.gov/publication/dhscbpia-050-united-states-mexico-entryexit-data-sharing-initiative>

³⁶ Council of Europe. Table of ratifications of Convention 223. <https://www.coe.int/en/web/conventions/full-list?module=signatures-by-treaty&treatyNum=223>

³⁷ Law to Regulate Financial Technology Institutions. <https://www.diputados.gob.mx/LeyesBiblio/ref/lritf.htm>

³⁸ National Banking and Securities Commission (2020). General provisions relating to application programming interfaces standardized information technology standards referred to in the Law Regulating Financial Technology Institutions. Published in the DOF, June 4, 2020 https://dof.gob.mx/nota_detalle.php?codigo=5594445&fecha=06/04/2020#gsc.tab=0

³⁹ General Law on Transparency and Access to Public Information. <https://www.diputados.gob.mx/LeyesBiblio/pdf/LFTAIP.pdf>

⁴⁰ As an example, that of the INAI: https://home.inai.org.mx/?page_id=1643

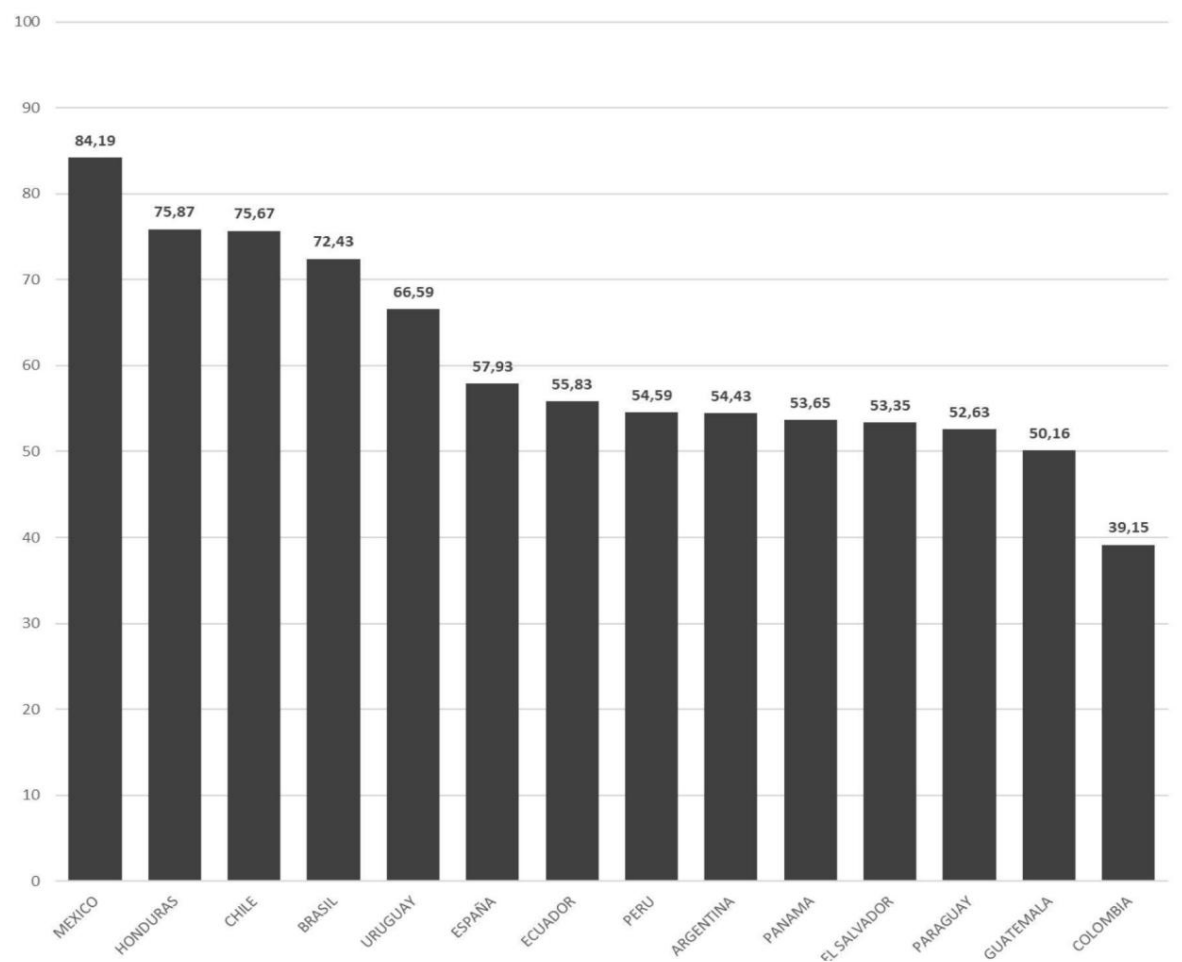
⁴¹ National Transparency Platform. <https://www.plataformadetransparencia.org.mx>

There are regulatory limits to algorithmic transparency. For example, the USMCA's digital trade provisions limit governments' ability to require the disclosure of proprietary algorithms and computer source code.

According to the Center for Law and Democracy's Global Right to Access Information Ranking⁴³, Mexico ranks second out of 138 countries evaluated with a score of 136/150, reflecting the strengthening of the legal framework for the right to know.

The Transparency and Access to Information Network (RTA), which brings together 18 Ibero-American countries, applies a measurement model that quantifies the evolution of different aspects related to the transparency and access to information policies of its member countries. In 2022, the study ranked Mexico first among the 14 countries evaluated, with a percentage of 84.1944.

Figure 2. Figure 2: Overall score of the Transparency and Access to Information Network indicator model (Ibero-America)



Taken from: Complutense Institute of Administration

Regarding national statistics, Mexico achieves a score of 70 out of a possible 100, ranking 31st out of 195 countries, according to the ODIN-Open Data Inventory 2022/2023. This ranking reflects the maturity and technical quality of the National Information, Statistics, and Geography System, led by INEGI, a constitutionally autonomous body.

It should be noted, however, that in terms of openness, the country is ranked 81st.

42 United States-Mexico-Canada Free Trade Agreement, Chapter 19. <https://ustr.gov/sites/default/files/files/agreements/FTA/USMCA/Text/19-Digital-Trade.pdf>

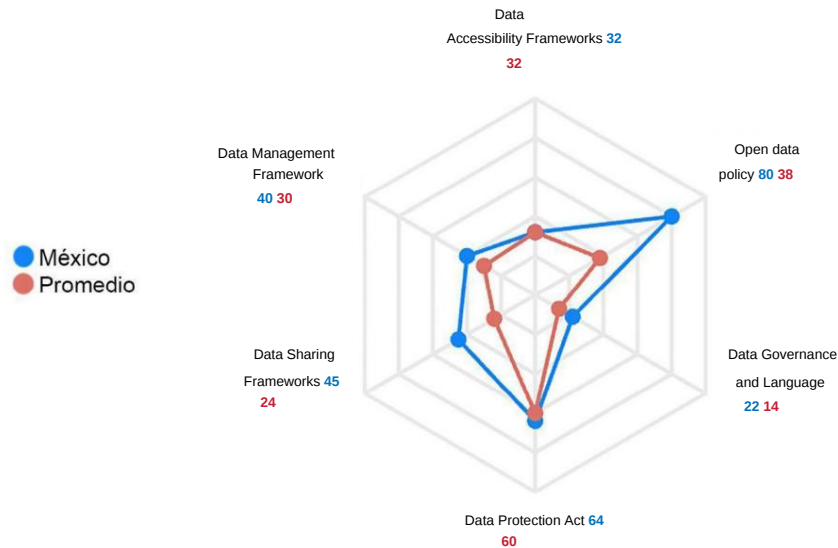
43 Global Right to Information Rating. <https://www.rti-rating.org/country-data/>

44 Complutense Institute of Information Science (2022). Results Report of the Application of the Information Science Indicators Model RTA: General Diagnosis and Improvement Proposals. https://redrta.org/wp-content/uploads/2022/09/GENERAL-REPORT-COMPARED_EntregaRTA_04-07-2022.pdf

45 ODIN - Open Data Inventory 2022/2023. The Open Data Inventory (ODIN) measures the state of official statistics in many countries, particularly in terms of their openness. <https://odin.opendatawatch.com/Report/biennialReport2022#:~:text=The%20median%20ODIN%20openness%20score,by%200.8%20points%20to%2047.5>

According to the Global Data Barometer, which assesses the state of data in 109 countries between 2019 and 2021, in aspects of data governance, capacity, availability and use in a variety of sectors, Mexico ranked 51st overall.^{46, 47}

Figure 3. Mexico's score on the Global Data Barometer (governance module)



Taken from: Global Data Barometer⁴⁸

Mexico participated in the development of the International Open Data Charter and committed to implementing it in 2014, becoming the first country in the world to publish information on the planning, bidding, awarding, contracting, and implementation stages of procurement using the Open Contracting Data Standard in the bidding process for the Shared Network.

In fact, information published on the website of the Open Contracting Partnership, an organization whose mission is to open public contracting through disclosure, data, and international participation so that the sums involved in public contracts are spent honestly, fairly, and effectively, indicates that Mexico was at the forefront of innovation and collaboration around open contracting.

Within the framework of the United Nations General Assembly in 2015, Mexico signed the International Open Data Charter with 150 other countries, with the aim of coordinating and promoting the adoption of open data at a global level and with the purpose of these principles forming a framework for common action so that data would be "a vehicle for sustainable development"⁵¹.

That same year, the Decree establishing the Regulation on Open Data was published in the Official Gazette of the Federation. This decree stipulates that "public data generated by agencies and entities of the Federal Public Administration and by state-owned productive enterprises will be made available to the public as open data, with the aim of facilitating their access, use, reuse, and redistribution for any purpose." Similarly, on June 18, 2015, the Data Policy Implementation Guide was published in the Official Gazette of the Federation. ⁵² Mexico also committed to exploring the interoperability of public contract databases at the 2016 London Anti-Corruption Summit. ⁵³

More recently, there is the Transparency, Open Government and Open Data Policy of the Federal Public Administration 2021-2024, issued by the Ministry of Public Administration. ⁵⁴ However, despite these efforts, the implementation of open government and open data in Mexico has not yet become a reality.

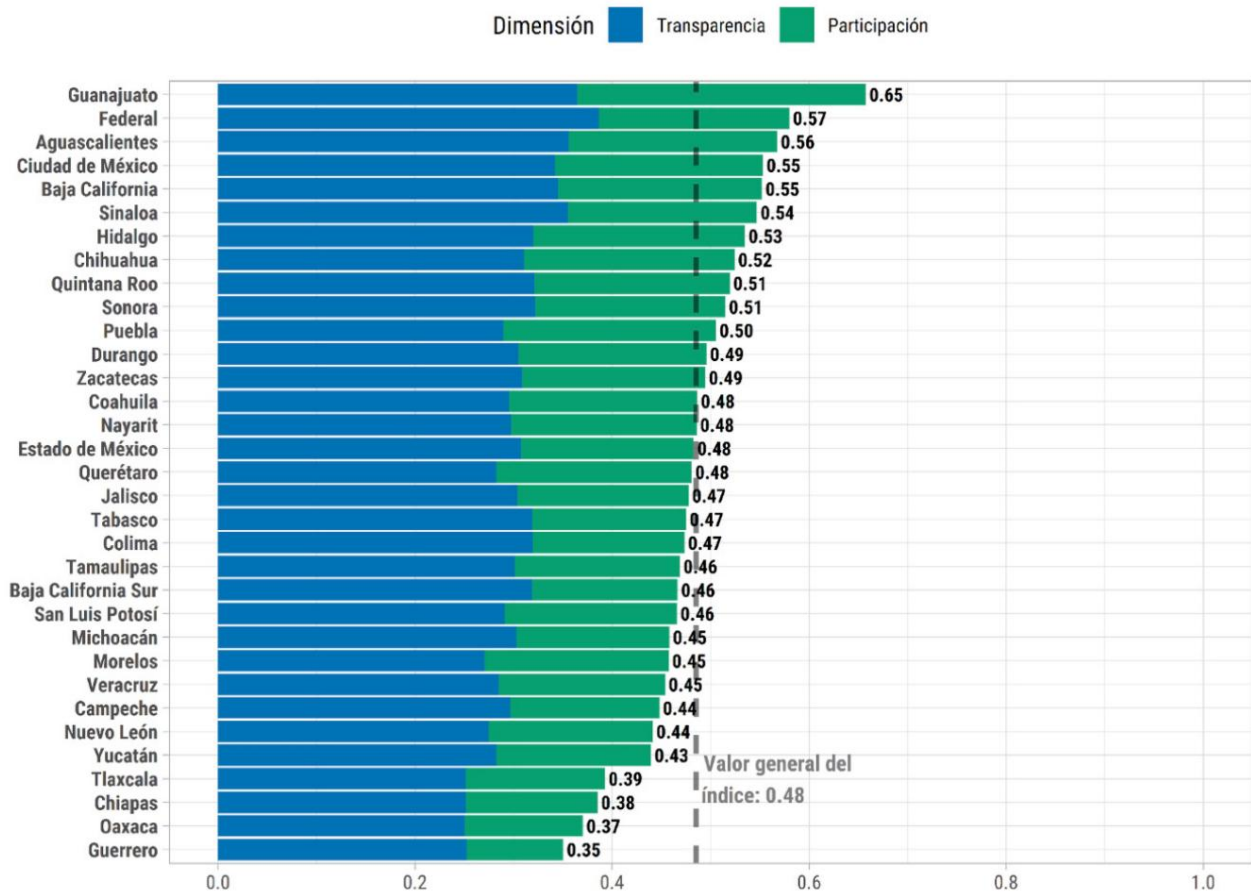
⁴⁶ Global Data Barometer. <https://globaldatabarometer.org/country/mexico/>
⁴⁷ Mexico's ratings in the Global Data Barometer are not consistent with those published by other organizations such as Oxford Insights, possibly because the former are obtained from surveys based on the opinions of those surveyed.
⁴⁸ Own translation.
⁴⁹ Open Contracting Partnership. Open Contracting in Mexico. <https://www.open-contracting.org/country/mexico/>
⁵⁰ Ibid.
⁵¹ Presidency of the Republic (2015). Today Mexico launches the International Open Data Charter. <https://www.gob.mx/epr/es/articulos/hoy-Mexico-launches-the-international-open-data-charter>
⁵² DOF 06/18/2015. Open Data Policy Implementation Guide. https://www.dof.gob.mx/nota_detalle.php?code=5397117&date=06/18/2015#gsc.tab=0
⁵³ Commitments of the Government of Mexico to the London Anti-Corruption Summit, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/522966/Mexico.pdf
⁵⁴ SFP (2021). Transparency, Open Government, and Open Data Policy of the APF. https://cdn.datos.gob.mx/apps/guia/Politica_de_Transparency_Open_Government_and_Open_Data_of_the_APF_2021-2024.pdf

In 2022, INAI launched "Abramos México" (Let's Open Mexico), a multisectoral initiative involving representatives of civil society, academia, authorities, and local guarantor agencies. This initiative seeks to collaboratively advance the design of a policy that guarantees open data and to build the National Open Data Policy. 55 The strategy includes a specific component for the public sector, which seeks to promote the adoption of open data standards for public procurement and public works projects and to improve the quality and availability of information on public spending on advertising and social communication.

On October 9, 2023, the National Transparency System approved the National Open Data Policy, which will come into force in 2024 and will be evaluated in 202556. The aforementioned policy recognizes open data as a strategic and valuable resource that contributes to the generation of knowledge, capacity building, innovation, impact on individual and collective situations or problems, transformation of the environment, and the materialization of direct and indirect benefits for people and organizations in different sectors in the country.

The Open Government Metric57 is an instrument promoted by the INAI (National Institute of Statistics and Census) and the National Transparency System (National Institute of Statistics and Census) that measures the degree of openness of a representative sample of institutions from the three branches of government and all three levels of government. This study, in its third edition (2021), includes an "Open Data Component" that evaluates, on a scale of 0 to 1, whether a regulated entity makes information about its responsibilities available to the public in open data format and the quality of that data. It highlights the national average for data openness of 0.16, with the Federal Government obtaining the highest score, at 0.4658. The study indicates that 76.3% of the 1,365 entities analyzed do not publish open data. This measurement will serve as a baseline for monitoring the progress of the National Open Data Policy.

Figure 4. Open Government Index 2021 by federal entity



Taken from: Open Government Metrics 2021

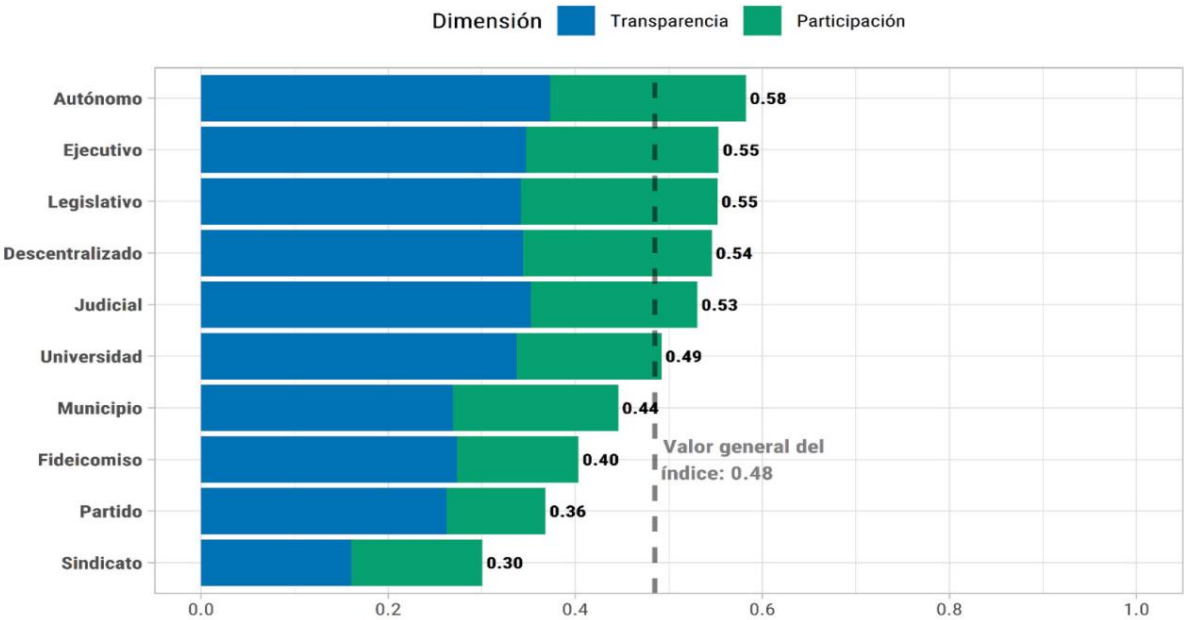
55 The website for this initiative is in beta version: <https://abramosmexico.org.mx/condatos/>

56 SNT. Agreement by which the national council of the national system of transparency, access to public information and protection of personal data approves the "National Open Data Policy. <https://snt.org.mx/wp-content/uploads/CONAIP-SNT-ACUERDO-ORD02-09-10-2023-03.pdf>

57 INAI (2022). Open Government Metrics. https://micrositios.inai.org.mx/gobiernoabierto/wp-content/uploads/2022/03/Reporte-final_MGA-2021.pdf

58 Ibid.

Figure 5. Open Government Index by type of obligated subject



Taken from: Open Government Metrics 2021

In its 2023 edition, the Open Government Metric had adjustments to its methodology to harmonize relevant elements of the National Open Data Policy with the measurement instrument.

Regarding international assessments, in 2018 the OECD published a report on the progress and challenges of the country's open data policy. The document recognizes what has been achieved since the previous report, published in 2016, and details an overview of the challenges and recommendations for action. Among the report's many recommendations, the following stand out: strengthening institutional governance by creating positions that oversee data policy and digital transformation; creating an agency to coordinate the country's digital agenda; securing budgetary resources to implement data policy; and developing a roadmap for the implementation of a national digital agenda.

DUE PROCESS AND ACCOUNTABILITY

The main law protecting due process rights in Mexico is Article 14 of the Constitution, which recognizes the guarantee of a hearing, equality before the law, the presumption of innocence, and the right to legal defense. In Mexico, it is not possible to punish a crime not clearly established by law, nor to impose imprisonment for debt, nor to confiscate property for political reasons or the expression of opinions.

In addition, there are laws and regulations that protect due process rights, including:

- The Federal Penal Code, which establishes the crimes and their penalties⁶⁰.
- The National Code of Criminal Procedure, which determines criminal procedure in Mexico⁶¹.
- The General Law of the National Public Security System, which defines the rights of detained persons⁶².

Overall, Mexico has a solid legal framework that protects due process rights from a human rights perspective. However, its implementation poses challenges, such as the lack of access to justice for low-income people and historically discriminated groups.

59 OECD (2018). Open Government Data in Mexico. https://read.oecd-ilibrary.org/governance/open-government-data-in-mexico_9789264297944-on#page11

60 Federal Penal Code. <https://www.diputados.gob.mx/LeyesBiblio/pdf/CPF.pdf>

61 National Code of Criminal Procedure. <https://www.diputados.gob.mx/LeyesBiblio/pdf/CNPP.pdf>

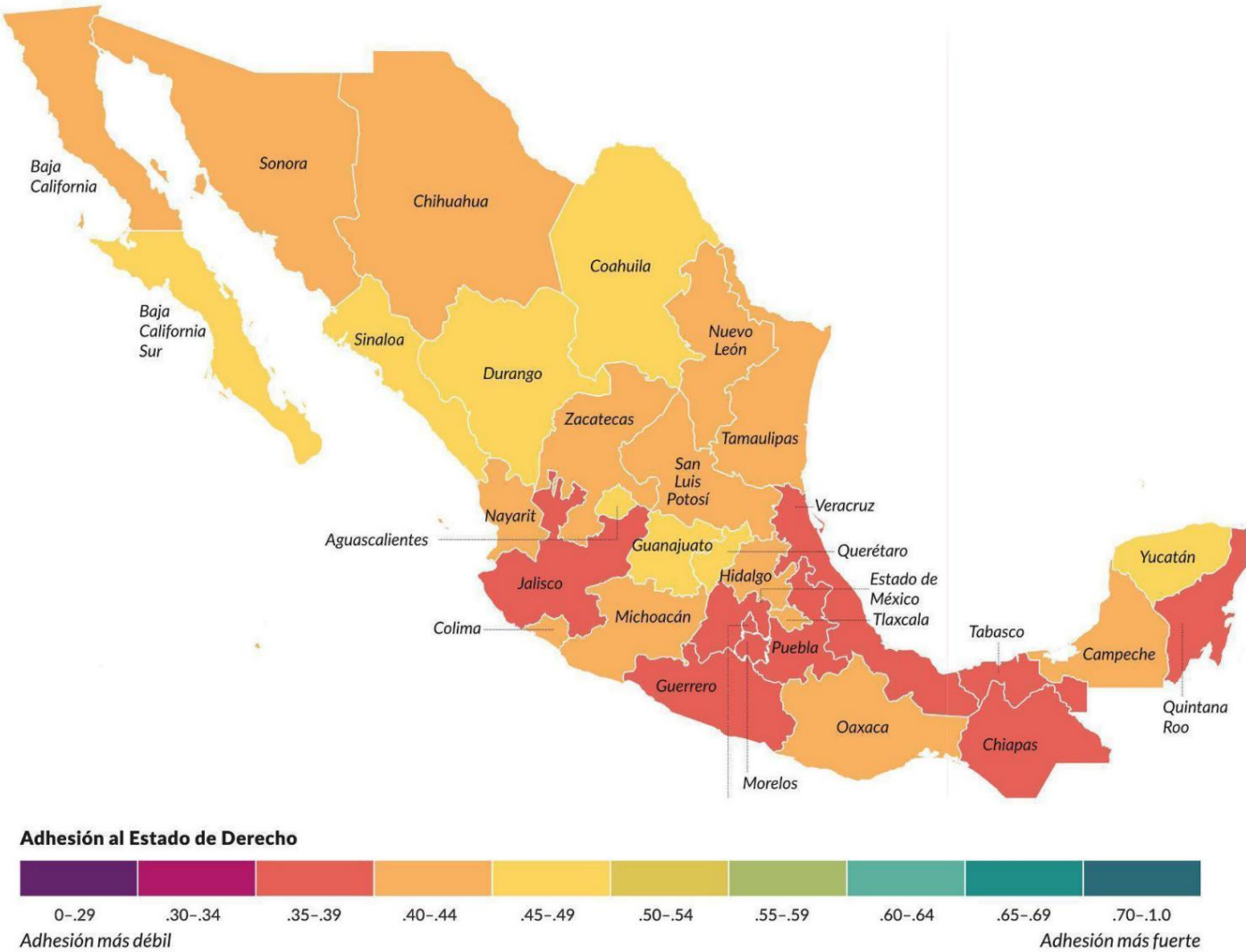
62 General Law of the National Public Security System. <https://www.diputados.gob.mx/LeyesBiblio/pdf/LGSNSP.pdf>

In 2016, the National Law on the Enforcement of Criminal Cases⁶³ was passed, establishing the rights of persons deprived of their liberty. In 2019, the Amnesty Law⁶⁴ was passed, granting this benefit to individuals convicted of certain crimes, including political and opinion crimes.

In the World Justice Project's Rule of Law Index (WJP Rule of Law Index), Mexico achieves a score of 0.37 (out of 1.0) in the civil justice component, which measures access to justice, without discrimination, without corruption, without undue government influence, with timeliness, effective application, and the availability and accessibility of alternative mediation mechanisms.⁶⁵

It thus ranks 131st out of 142 countries, noting that the score has steadily declined from the 0.44 level prevailing in 2015. The right to privacy sub-index reaches 0.41 out of 1. There are significant differences among states regarding the rule of law, with the states with the lowest scores also being those with the lowest incomes.

Figure 6. Rule of Law Index in Mexico 2022-2023



Taken from: World Justice Project Rule of Law Index 2022-2023

63 National Law on Criminal Enforcement <https://www.diputados.gob.mx/LeyesBiblio/pdf/LNEP.pdf>
64 Amnesty Law. https://www.diputados.gob.mx/LeyesBiblio/pdf/LAmn_220420.pdf
65 World Justice Project. Rule of Law Index. <https://worldjusticeproject.org/rule-of-law-index/country/2023/Mexico/Civil%20Justice/>

Reports by organizations such as Human Rights Watch and Amnesty International have pointed out serious deficiencies in the protection of rights such as due process and the presumption of innocence.⁶⁶ These reports focus on criminal matters and military involvement.

Regarding artificial intelligence, there is no law or policy in Mexico that outlines mechanisms for tracking, monitoring, and remedying harm caused specifically by AI systems in the justice system. However, the existing framework for criminal and civil liability could be applied to claim reparation and compensation for damages. If the case involves the processing of personal data, the claim mechanisms established in the LFPDPPP (Spanish Law on Personal Data Protection) could also be applied.

ONLINE SECURITY AND SPEECH INTEGRITY

Although the Supreme Court has ruled that hate speech is not protected by freedom of expression, there are no notification, suspension, or removal mechanisms for hate speech, false information, or disinformation (except as noted below in the case of radio and television). However, these protections do exist for copyrighted material. In 2020, the Federal Copyright Law was amended with the entry into force of the USMCA⁶⁷ to require online service providers, websites, platforms, or digital search engines to remove and deny access to any infringing material, work, or content upon receiving notice from the corresponding copyright owner.

It was established that "internet service providers" are not liable as long as they prove that they do not control, initiate, or direct the infringing conduct, even if it occurs through their networks or systems, or when they promptly remove the content upon notice from the copyright holder. They are also not required to monitor the use of works or content on the Internet or to notify infringing users.

The INAI or the guarantor agencies are empowered to order precautionary measures if they detect imminent or irreparable harm to the protection of personal data, and may therefore order the suspension or deletion of online data.

Although there is no general notice and takedown framework for hate speech and disinformation, there is one for content that violates audience rights in the case of broadcasting (television and radio) and is limited to the protection of children. The regime is found in the Federal Telecommunications and Broadcasting Law (LFTR)⁶⁸, Article 15, Sections LX and LXI. However, these powers have never been applied, and no mechanisms for doing so have been defined.

Regarding the liability applicable to online intermediaries, Mexico does not have general regulations, although there are rules applicable to intellectual property, in addition to the general rules on civil liability (articles 1910 and 1913 of the Federal Civil Code) and criminal liability.

Mexico also lacks specific legislation, policies, or assessments on the impact of AI on social media.

However, the country has legal frameworks related to social media, which are part of the telecommunications sector and are part of the right of access to information and communication technologies established in Article 6 of the Constitution.

This provision mandates the State to guarantee, in addition to the right of access to information and communications technologies, access to the internet, which is closely related to access to social networks.

The LFTR, for its part, includes a chapter entitled "Network Neutrality," which establishes the guidelines to which internet access providers are required to adhere, such as free choice by users; non-discrimination; user privacy and network security; transparency and information; traffic management; and quality and sustained development of the infrastructure (Articles 145 and 146).

⁶⁶ Human Rights Watch (2022). World Report Mexico. <https://www.hrw.org/world-report/2022/country-chapters/mexico>

⁶⁷ In Chapter V entitled "Technological Protection Measures, Information on Rights Management and Providers of Internet Services."

⁶⁸ Federal Telecommunications and Broadcasting Law. <https://www.diputados.gob.mx/LeyesBiblio/ref/lftr.htm>

CYBERSECURITY

Since 2005, Mexico has annually compiled a National Risk Agenda (ANR). Artificial intelligence appears to have been included in the annual agendas since 2009, but these agendas are classified as confidential information and cannot be verified.⁶⁹ In 2010, the National Cyber Incident Response Center (CERT-MX) was launched.

Under the current administration, CERT-MX became part of the National Guard's Scientific Directorate. Its mission is to "provide support services in responding to cyber incidents affecting the country's institutions that have critical information infrastructure, including identifying threats and cybercrime *modus operandi* to alert the public, managing cybersecurity incidents, serving as the sole point of contact and coordination within and outside the country, and participating in digital forensic investigations and technical police analysis in support of the Public Prosecutor's Office."

Since 2015, National Cybersecurity Week has been organized, with the participation of the Ministry of National Defense, in conjunction with academia, public, and private institutions and organizations specializing in the subject. In 2016, the Standardized Model for Cyber Police Units⁷¹ was approved, which includes the development of a cybersecurity strategy. In total, more than 11 cybersecurity bills have been passed since 2018, including the National Standardized Cyber Incident Management Protocol coordinated by the Presidency in 2022.

Mexico voted in favor of the Council of Europe Convention on Cybersecurity, also known as the Budapest Convention, in 2014. Although the Senate has not yet ratified it, a point of agreement for its ratification was recently proposed.

Currently, Mexico lacks specific legislation on cybersecurity. The cyberattack on the Ministry of National Defense (Sedena) in 2022 highlighted the need for joint efforts in this area, prompting the introduction of the Federal Cybersecurity Law⁷⁴ in the Chamber of Deputies in April 2023. However, this initiative raised concerns about potential censorship, invasion of privacy, and the militarization of cybersecurity.

In March 2024, its withdrawal was requested⁷⁵.

⁶⁹ Confidential information according to the National Intelligence Center, Transparency Unit, in its response to a request for

Information, folio 0410000013921: <https://serendipia.digital/wp-content/uploads/2023/02/Solicitud-Agenda-Nacional-de-Riesgos-1.pdf>

⁷⁰ Government of Mexico. Cyber Incident Response Center of the Scientific Directorate of the National Guard. <https://www.gob.mx/gncertmx?tab=%C2%BFQu%C3%A9%20es%20CERT-MX>.

⁷¹ Approved Model of Cyber Police Units. https://www.gob.mx/cms/uploads/attachment/file/189189/Modelo_homologado_cyber_police_units.pdf

⁷² Coverage 360. Villafranco, G. (2023). Coverage 360. This is how the cybersecurity strategy has advanced during the last decade in Mexico. <https://coverage360.mx/2023/02/21/security/advance-cybersecurity-strategy-mexico-2009-2021/>

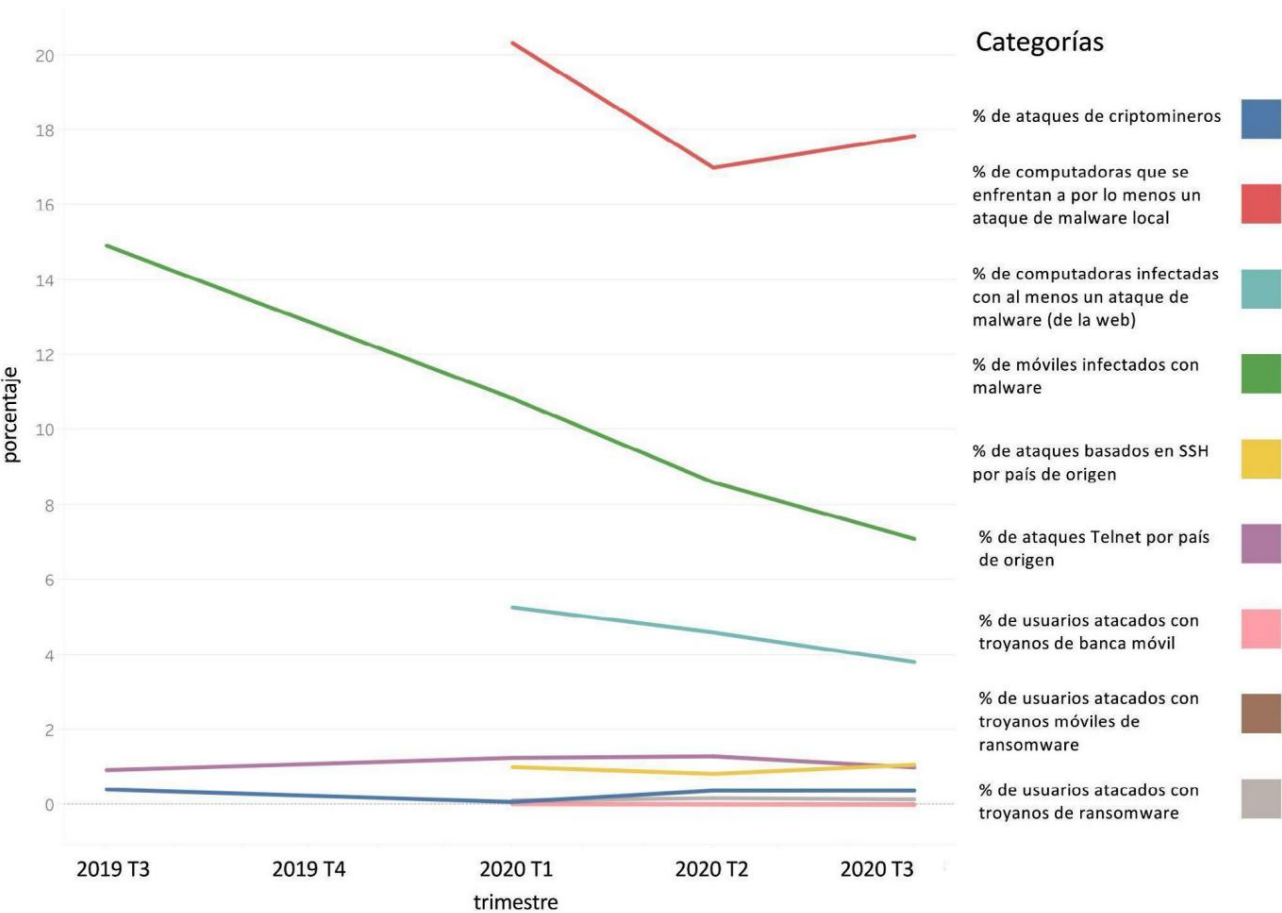
⁷³ Senate of the Republic. Proposal with a point of agreement urging the Ministry of Foreign Affairs to assess the feasibility of Mexico's accession to the Budapest Convention. http://sil.gobernacion.gob.mx/Archivos/Documentos/2023/03/asun_4501971_20230301_1677602035.pdf

⁷⁴ Chamber of Deputies (2023). Parliamentary Gazette. Year XXVI. Number 6262-II-2. https://www.diputados.gob.mx/LeyesBiblio/iniclave/65/CD-LXV-II-2P-292/02_iniciativa_292_25Abr23.pdf

⁷⁵ Parliamentary Gazette. Letter from Representative Casarín to the President of the Board of Directors of the Chamber of Deputies, requesting the withdrawal of the proposed Federal Cybersecurity Law. <https://gaceta.diputados.gob.mx/Gaceta/65/2024/mar/20240313-I.html#ComunicacionOficial1>

The sum of these efforts has been improving some cybersecurity indicators, as seen in Figure 776.

Figure 7. Incidence of cyberattacks by category in Mexico



Taken from: Comparitech77

However, the country's cybersecurity environment is weak. According to SEON, Mexico ranks 64th out of 93 countries in terms of vulnerability to cyberattacks, with 57 points out of 10,078.

PUBLIC SECTOR CAPACITY

There is no national strategy or plan to improve digital skills in the public sector, nor are there any plans for digitalization, cybersecurity, or equipment, except for austerity measures. Isolated efforts have been made, such as the "Strategy for Strengthening Digital Skills," which in 2021 enabled the training of 738 officials in the state of Puebla,⁷⁹ or the IFT's annual training program for public servants, which includes, among other aspects, data science, soft skills, and technical knowledge at different levels.

76 Comparitech. Which countries have the worst (and best) cybersecurity? Global Rankings. <https://www.comparitech.com/blog/vpn-privacy/cybersecurity-by-country/>

77 Ibid. (own translation) 78

SEON Cybersecurity Index, built from the National Cybersecurity Index (NCSI) of the e-Governance Academy Foundation (updated in real time), the Global Cybersecurity Index, GCI of ITU (2020) and the Cybersecurity Exposure Index, CEI of Password Managers (2020), https://resources.cdn.seon.io/uploads/2023/04/Cybersecurity_countries_Es.pdf

79 Government of Puebla (2021). Government promotes the development of digital skills for public servants. <https://www.puebla.gob.mx/index.php/news/item/4531-government-promotes-development-of-digital-skills-of-public-servants>

In the State Digital Policy Assessment conducted by the Center for Studies and Research in Public Affairs (CEIAP),⁸⁰ all states received a score of zero on the digital skills component in the public sector (it is important to note that the index is binary, zero or one). Furthermore, some authorities are implementing initiatives to boost digital skills among the population, but there is no national digital skills program.

For example, the IFT promotes skills among the population through courses, workshops, and conferences on subjects such as cybersecurity, social media management, robotics, media and information literacy, among others. There are also some programs in which private companies collaborate with the federal government to support digital literacy efforts (for example, with Facebook, Cisco , or Microsoft).

⁸⁰ CEIAP (2023). Evaluation of the state digital policy. <https://www.ceiap.mx/evaluacion-de-la-politica-digital-estatal-2023/>

⁸¹ Ministry of Culture. Digital Skills Training Program. <https://mexicocreativo.cultura.gob.mx/programa-de-capacitacion-en-digital-skills-1/>

⁸² Ministry of Labor and Social Security (2022). Joint Communiqué 073/2022. [https://www.gob.mx/stps/prensa/lanzan-la-2-fase-del-Digital-skills-program-for-21st-century-Mexican-women?idiom=es-MX#:~:text=The Secretariat of Economy %ADa%2C%20the%20Secretary%20of%20Labor,%20employment%2C%20to%20start%20their%20undertakings%20or%20improve%20their%20business.](https://www.gob.mx/stps/prensa/lanzan-la-2-fase-del-Digital-skills-program-for-21st-century-Mexican-women?idiom=es-MX#:~:text=The%20Secretariat%20of%20Labor,%20employment%20to%20start%20their%20undertakings%20or%20improve%20their%20business.)

⁸³ Ibid.

SOCIOCULTURAL DIMENSION

This second dimension explains the status and challenges faced in terms of diversity, inclusion, equality, trust, public participation, environmental sustainability, health, social well-being, and culture.

DIVERSITY, INCLUSION AND EQUALITY

According to ENDUTIH 2022⁸⁴, inequalities in access to technology persist, especially in the workplace and in single-parent households headed by women, where significant differences are evident in spending on mobile and fixed broadband.

According to Centro México Digital⁸⁵, only 21% of women use the internet at work, a difference of 11 percentage points compared to men; single-parent households headed by a woman spend 15% less on mobile broadband and 3% less on fixed broadband than other households, and in some states, the average spending of these latter households on mobile broadband is 40% higher than that of those who rely exclusively on a woman's income.

Figure 8. People who use the Internet at work, by gender



The 2022 ENDUTIH (National Institute of Statistics and Census of Mexico) indicates that the gap in internet use between urban and rural populations in Mexico is 21.5 percentage points. In urban areas, 83.8% of the population uses the internet, while in rural areas the figure is 62.3%.

This gap has narrowed in recent years, but it remains significant. In 2019, the gap was 28 percentage points.

Likewise, according to the 2022-2023 Higher Education Statistical Yearbook, only 32% of STEM graduates in 2023 were women. ^{87,88} The gender gap in higher education graduates in STEM fields in Mexico is approximately 2 to 1: twice as many men graduate as women in these fields.

⁸⁴ INEGI (2022). National Survey on the Availability and Use of Information Technologies in Households (ENDUTIH).
⁸⁵ Centro México Digital. Gender Gap Report. <https://centromexico.digital/wp-content/uploads/2022/11/reporte-brecha-de-genero.pdf> ⁸⁶ INEGI (2023). National Survey on Availability and Use of Information Technologies in Households, ENDUTIH, 2022. <https://www.inegi.org.mx/programas/dutih/2022/>
⁸⁷ ANUIES. <http://www.anui.es.mx/informacion-y-servicios/informacion-estadistica-de-educacion-superior/anuario-estadistico-de-educacion-superior>
⁸⁸ The ANUIES calculates this figure by adding the categories of natural sciences, mathematics and statistics; engineering, manufacturing and construction; and information and communication technologies. It is important to note that this statistic does not include behavioral or social sciences, and that there is no standardized definition of STEM or STEAM disciplines, so the possibility of comparing them with other sources and across countries is limited.
⁸⁹ IMCO (2022). Where are the female scientists? Research report. https://imco.org.mx/wp-content/uploads/2022/02/%C2%BFD0%CC%81n-of-this%CC%81n-the-scienti%CC%81ficas__Document_20220201.pdf

Figure 9. STEM subject graduates by gender



According to the PISA 2022⁹⁰ test, boys outperform girls by 12 points in mathematics, while girls outperform boys by 8 points in reading. But gaps can also be identified in girls' expectations, who, even when they show high performance in mathematics, do not expect to develop in STEM subjects. According to the 2018 PISA test, of girls with high performance in science or mathematics (level 5 or 6), only 27% expected to be professionals in a field related to science or engineering by the time they were 30. The same figure was 43.2% among boys. The average results in 2022 were lower than those of 2018 in both mathematics and science. In fact, in mathematics, the results were similar to those of 2003 or 2006.

According to the ITU Internet Gender Gap, Mexico shows a small gender gap in internet use, with a gender ratio of 0.996. Between 2019 and 2022, this gap narrowed from 3.3% to 1.2%.⁹¹

Equality between women and men is protected in the Constitution, as is the right of the entire population to integrate "into the information and knowledge society, through a policy of universal digital inclusion with annual and six-year goals" (Article 6). Likewise, Article 2 of the Constitution, Section B, Point 7, establishes the right of indigenous communities to incorporate technologies to increase their own productive capacity.

Laws and policies have also been enacted to reduce the gender digital divide. The LFTR establishes that competent authorities must promote access to telecommunications and broadcasting for all sectors of the population, without discrimination based on gender. This law contains various provisions on digital inclusion by gender.

The General Law on Women's Access to a Life Free of Violence (LGAMVLV)⁹² establishes that the State must promote the use of information and communications technologies to prevent and eradicate violence against women. The National Program for Equality between Women and Men 2021-2024⁹³ establishes the objective of "guaranteeing women's access to Information and Communication Technologies (ICTs) for their comprehensive development."

The General Law on Humanities, Sciences, Technologies and Innovation (LGMHCTI), which came into force on May 8, 2023, indicates that the State must promote training, research, dissemination and development of projects in the fields of humanities, sciences, technologies and innovation to be carried out under the principles of epistemological rigor, equality and non-discrimination⁹⁴.

Similarly, some authorities are taking various actions to reduce the gender and other digital divides. For example, the IFT provides specific training for women, girls, and young people and publishes the ICT Use Probabilities Calculator, a tool that raises awareness about structural social inequalities and how they impact digital inclusion. ⁹⁵ However, there are no evaluations of the effectiveness of the right to digital inclusion by gender or of the actions taken in Mexico to achieve this goal.

Programs have also been launched to close socioeconomic and rural/urban gaps. One of these is Internet for All, which seeks to close the coverage gap and "enable the integration of the population into internet and mobile phone technology." throughout the national territory"⁹⁶.

⁹⁰ OECD. PISA Test. https://www.oecd.org/pisa/publications/Countrynote_MEX_Spanish.pdf

⁹¹ It is important to consider, however, that to construct this statistic, the number of people who used the internet at least once in the preceding three months is added together, so there may be gaps that the indicator does not capture. <https://www.digitalgendergaps.org/>

⁹² General Law on Women's Access to a Life Free from Violence. <https://www.diputados.gob.mx/LeyesBiblio/pdf/LGAMVLV.pdf>

⁹³ National Institute of Women. National Program for Equality between Women and Men. <https://www.gob.mx/inmujeres/acciones-y-programas/national-program-for-equality-between-women-and-men>

⁹⁴ General Law on Humanities, Sciences, Technologies, and Innovation. <https://www.diputados.gob.mx/LeyesBiblio/pdf/LGMHCTI.pdf>

⁹⁵ IFT. Calculator of the probability of ICT use and internet activities in Mexico <https://calculadoraprob.ift.org.mx/>

⁹⁶ Government of Mexico. Internet for all. <https://www.gob.mx/internetparatodos>

With the collaboration of the state-owned company CFE-Telecommunications and Internet for All, the state agency for the Promotion of Investments in Telecommunications (Promtel) and the public-private wholesale network Altán, they are promoting a project to increase access and quality of connectivity to the population, with a coverage goal of 92.2% by 2028. To date, coverage has been reached in 809 localities with more than 10,000 inhabitants (with a population of 56,824,556) and 98,941 localities with less than 250 inhabitants covered (with a population of 22,277,414)⁹⁷.

Some other initiatives are as follows:

- The Jalisco Network, launched in 2020 by the Jalisco state government in collaboration with CISCO, to provide internet free to more than 13,000 public sites, with the aim of promoting digital skills in the population.
- "Seeds for the Future" from the Ministry of Infrastructure, Communications and Transportation and the Huawei company, to promote Mexican ICT talent.
- "Digital Communities" of the Mexico City government, American Tower and Save the Children, to create spaces digital that provide access to ICTs to communities that need them.
- The Public Site Connectivity Program 2023 (PCSP 2023) aims to identify and locate public sites throughout the national territory with free internet connectivity needs in order to achieve universal coverage⁹⁸.
- México Conectado, launched in 2013, established 32 centers offering ICT learning, innovation, and entrepreneurship programs, training more than 500,000 people.

Some telecommunications service providers have coverage obligations for their networks to be deployed in rural communities, as is the case in Altán. The IFT oversees these obligations.

The Economist magazine's Inclusive Internet Index, in its 2022 edition, includes 100 countries and groups several indicators into four categories related to digital inclusion. 100 If we take Chile as a reference for regional progress, in availability Mexico ranks 52nd and Chile 27th; in affordability Mexico ranks 21st and Chile 13th; in relevance Mexico is 36th and Chile 9th; and in readiness Mexico ranks fourth and Chile third.

The principle of gender parity established in Article 41 of the Constitution applies to the executive and legislative branches, autonomous bodies, and the nomination of candidates for elected office. This is encouraging an increasing number of female legislators and public servants to work on issues related to science and AI.

Additionally, there is no similar provision for the private or social sectors. In fact, technology companies are not required to make their diversity statistics public. Only when they receive public funds are they subject to the transparency obligations of government entities.

There are no affirmative action obligations or standards to improve diversity throughout the AI lifecycle, although some public and private entities voluntarily adopt them. For example, the IFT issues job openings exclusively for women and for intercultural universities.

Regarding STEM skills, there are numerous public, federal, local, and private programs in Mexico to promote diversity in STEM.

Higher education institutions are not required to publish their diversity statistics, but INEGI produces education statistics with various disaggregations for gender, socioeconomic status, rural and urban population, and other classifications. UNAM has a Gender Coordination Office that publishes various publications on its programs, actions, and protocols, but not on inclusion or diversity statistics.

⁹⁷ Data as of December 2023, consulted at <https://www.redcompartida.igg.unam.mx/mae/home> ⁹⁸ Secretariat of Communications. Public Site Connectivity Program 2023. https://www.gob.mx/cms/uploads/attachment/file/791995/PCSP_2023.pdf

⁹⁹ Presidency of the Republic. Connected Mexico Point. <https://www.gob.mx/epn/es/articulos/punto-mexico-conectado-142554> ¹⁰⁰ The Economist. Even Internet Index. <https://impact.economist.com/projects/inclusive-internet-index/>

¹⁰¹ UNAM Gender Equality Coordination. Institutional information on gender equality at UNAM. <https://coordinaciongenero.unam.mx/informacion-institucional-genero/>

The Monterrey Institute of Technology (ITESM) publishes an annual report on diversity and inclusion, which highlights initiatives and results in this area. The most recent report was published in 2021.

In 2022, UNAM published the results of its first university consultation on gender equality conditions in the LGBTTTIQ+ community, which was attended by 5,529 people, the majority (70%) under 25 years of age¹⁰³.

In the area of public procurement, there are no specific regulations requiring public sector suppliers to adopt diversity standards, but some calls for proposals request information on this aspect and consider it when evaluating technical or financial offers.

Regarding linguistic diversity, Mexico does not have an official language; the country recognizes 68 indigenous languages, according to INALI.¹⁰⁴ Certainly, Spanish is by far the predominant language, and indigenous languages face significant challenges, such as a reduced number of speakers and a limited presence in the digital realm.

Indigenous languages in Mexico are often excluded from the internet, and their speakers rarely interact online in their native languages. This results in a shortage of digital content and databases for training AI tools in these languages. Specific policies and actions are needed to address this issue, so that AI reflects the country's cultural and linguistic richness.

The preservation of cultural heritage and indigenous languages is fundamental to a comprehensive cultural policy. International guidelines exist, such as those proposed by UNESCO,¹⁰⁵ but Mexico has not implemented effective policies at the national level. INAH and INALI have shown interest in these topics. For example, INALI collaborated with Google on the Woolaroo app to preserve endangered languages, including Mayan and Tepehua.

Other authorities generate content and information in various indigenous languages, which they make available online.

The Senate of the Republic has discussed initiatives to integrate AI into the preservation of Indigenous languages. A "Report of the Joint Committees on Indigenous Affairs and Legislative Studies" suggests reforms to the General Law on Linguistic Rights of Indigenous Peoples to promote the use of technology that facilitates and improves interaction between authorities and Indigenous peoples and communities.

However, these efforts are more focused on the inclusion of Indigenous language-speaking populations than on the production of content and training data in different languages or the preservation of cultural and linguistic heritage. Likewise, the implications of exploiting cultural heritage, such as Indigenous art and languages, to feed AI systems that do not benefit the communities that own that heritage must be considered.

No coherent and far-reaching public policies have been consolidated on this issue. The lack of a clear state policy on AI for the preservation of Indigenous culture and languages significantly limits the impact of these initiatives.

¹⁰² Tecnológico de Monterrey. Diversity and Inclusion Report. <https://tec.mx/es/dignidad-humana/la-diversidad-y-la-inclusion-al-centro>

¹⁰³ UNAM (2022). Presentation of the results of the first university consultation on gender equality conditions for the LGBTTTIQ+ community at UNAM. <https://coordinaciongenero.unam.mx/2022/06/informe-ejecutivo-consulta-universitaria-comunidad-lgbtتيق-en-la-unam/>

¹⁰⁴ INALI. National Catalog of Indigenous Languages. <https://www.inali.gob.mx/clin-inali/>

¹⁰⁵ UNESCO. Artificial Intelligence with a Focus on Indigenous Peoples: Perspectives from Latin America and the Caribbean. <https://unesdoc.unesco.org/ark:/48223/pf0000387814?posinSet=1&queryId=49c364b7-4375-40c1-bfcd-42cb671f2d6e>

¹⁰⁶ Senate of the Republic (2023). Opinion of the Joint Committees on Indigenous Affairs and Legislative Studies, approving, with modifications, the Minutes with Draft Decree amending and adding various provisions of the General Law on Linguistic Rights of Indigenous Peoples. https://infosen.senado.gob.mx/sgsp/gaceta/65/2/2023-03-07-1/assets/documentos/Dict_Minuta_Com_Indigenous_Affairs_Section_XV_Article_13_General_Law_on_Linguistic_Rights.pdf

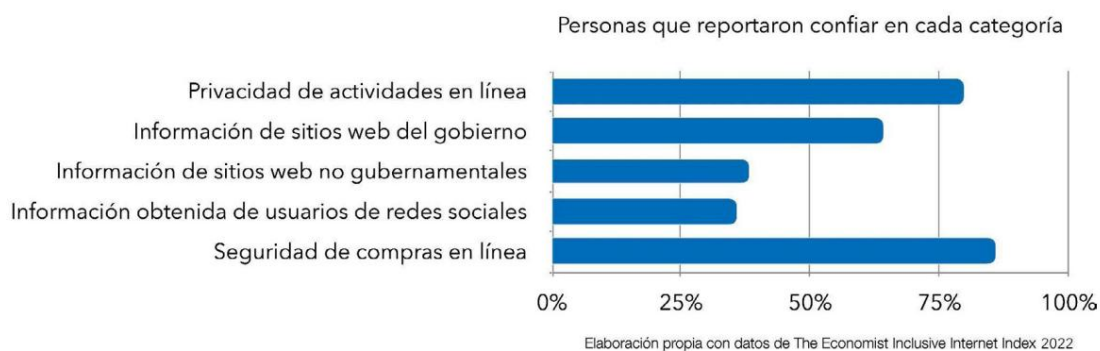
PUBLIC TRUST AND PARTICIPATION

In Mexico and other middle- and lower-middle-income countries, there is greater trust in AI and digital services, perhaps due to a lower awareness of the associated risks or more limited exposure to the potentially negative aspects associated with these technologies.

In 2021, the IFT published the study “Knowledge, perception and use of artificial intelligence by fixed and/or mobile internet users”¹⁰⁷, which found that, in general, people are not very concerned about the information they share for the use of AI tools, although on average women show greater disapproval than men regarding the collection of their data.

According to The Economist's 2022 Inclusive Internet Index, 80% of Mexicans said they were confident that their online activities were private; 64% said they trusted information from government websites; 38% trusted information from non-government sites; 36% trusted information obtained from social media users; and 86% thought it was safe to shop online.

Figure 10. Figure 10: Inclusive Internet Index trust metrics



An Ipsos study for the World Economic Forum¹⁰⁹ shows that in Mexico, as in other middle-income countries, people perceive that they have a better understanding of AI and their positive opinions exceed the global average.

Seventy-four percent of Mexican respondents stated they have a good understanding of AI; 65% believe this technology will have a positive and transformative impact on their lives; 62% think they know which products and services use AI; and 38% said services using AI make them anxious. This is in line with the results for countries such as Colombia, Chile, China, South Africa, Malaysia, India, and Turkey; while in countries such as France, Belgium, Australia, Canada, Italy, and Japan, fewer people say they understand what AI is, fewer think it will have an impact on their daily lives, and have less positive opinions about the technology.

SUSTAINABILITY

Mexico does not have a policy to address the impact of AI on the environment and sustainability. Although Mexico has a legal framework for environmental impact assessment, it applies to emissions, discharges, exploitation of natural resources, and other environmental impacts of works, constructions, and facilities. This framework is not applicable to the development of AI or its applications.

¹⁰⁷ IFT (2021). Knowledge, perception, and use of artificial intelligence by fixed and mobile internet users. <https://www.ift.org.mx/sites/default/files/general-content/users-and-audiences/estudioia2021.pdf>

¹⁰⁸ The Economist. Even Internet Index. <https://impact.economist.com/projects/inclusive-internet-index/>

¹⁰⁹ Ipsos (2022). Global opinions and expectations about AI. <https://www.ipsos.com/sites/default/files/ct/news/documents/2022-01/Global-opinions-and-expectations-about-AI-2022.pdf>

HEALTH AND SOCIAL WELL-BEING

There is no policy in the country on digital technologies in the health sector, such as those used for telemedicine or diagnostic tools. 110 In the field of medicine and health services, especially private ones, there are numerous AI applications but no policy to promote their adoption, ensure access to the entire population, or ensure that their use is ethical, transparent, respectful of privacy and the dignity of people.

Since 2010, the official Mexican standard NOM-024-SSA3-2010¹¹¹ was published, establishing the functional objectives and features that Electronic Medical Record System products must adhere to in order to guarantee the interoperability, processing, interpretation, confidentiality, security, and use of standards and catalogs of information in electronic health records. However, there is still no national interoperable system with a secure, comprehensive design, nor one where individuals control access to their data. By 2018, there were 65 different electronic medical record systems in Mexico¹¹².

CULTURE

Mexico does not have a cultural heritage preservation policy based on AI or digital technologies. However, projects proposed by higher education institutions existed before the recent rise and popularization of AI tools, such as the "Mobile application for the preservation of the native languages of Mexico using artificial intelligence," dating from 2019.

There are also proposals put forward in some forums organized by the INAH, such as the roundtable held in May 2023, "Scientific Diplomacy. Tool against the trafficking of cultural goods" (in which the use of artificial intelligence to create databases or track the trail of illicitly trafficked historical goods was proposed).

The Digital Culture Center¹¹⁵, a space of the Ministry of Culture, is responsible for the production, training, communication, and reflection on new cultural, social, and economic manifestations that arise from the everyday use of digital technology.

There is also the participation of decentralized agencies of the federal public administration, such as INALI, which collaborate on projects such as the aforementioned Woolaroo¹¹⁶ application.

The use of AI is increasingly common in cultural projects, both public and private. 117 One such project was developed by students at Chapingo University, who launched an application called Miyotl for learning indigenous languages, with the aim of preventing the extinction of the indigenous language-speaking community of 68 languages. 118 Some of the languages included in this tool are Nahuatl, Zapotec, Mixtec, Tzotzil, Tzeltal, Mayan, Chinantec, Mazatec, Mazahua, Mixe, Totonac, Chocholteco, Otomi, and Hñá Hñu. According to its designers, it is considered the largest database of its kind in the country and compiles information from the government and institutions, seeking to design AI for future text translation.

110 In 2021, a Digital Health Law initiative was introduced (health services provided through digital or technological means), which has not been reviewed. http://sil.gobernacion.gob.mx/Archivos/Documentos/2021/03/asun_4161366_20210324_1616609171.pdf More recently, an initiative was introduced to reform the General Health Law regarding teleconsultations, which includes smart devices and the use of AI systems, and another initiative for digital medical prescriptions. These initiatives have also not been approved. http://sil.gobernacion.gob.mx/Archivos/Documentos/2023/03/asun_4507593_20230308_1677181741.pdf

111 Ministry of Health (2010). Mexican Official Standard NOM-024-SSA3-2010. <https://www.dof.gob.mx/normasOficiales/4151/salud/salud.htm> 112 Statista. Mexico: Electronic Medical Record Systems 2018, by Institution. <https://es.statista.com/estadisticas/1177090/sistemas-electronic-clinical-records-by-institution-mexico/>

113 Rafael Pérez, Eva; Morales Hernández, Maricela; Vázquez Noyola, César Fidel; César Fidel; and Rubio Espinoza, Eva. Women in Science, Chapter 7: Mobile application for the preservation of Mexico's native languages using artificial intelligence. https://www.ecorfan.org/handbooks/Handbooks_Women_in_IT_Science/Handbooks_Women_in_IT_Science_7.pdf

114 National Institute of Anthropology and History. Proposes new tools for scientific and legal cooperation in favor of cultural heritage. <https://www.inah.gob.mx/boletines/proponen-nuevas-herramientas-de-cooperacion-cientifica-y-legal-en-favor-del-patrimonio-cultural>

115 Digital Culture Center. <https://www.centroculturaldigital.mx/>

116 Google Arts & Culture. Woolaroo. <https://artsandculture.google.com/project/woolaroo>

117 Some examples are: Mexico is Culture. Travelers in Time. <https://www.mexicoescultura.com/actividad/213815/viajeros-en-el-tiempo.html>; National Institute of Anthropology and History. Virtual Tours. <https://inah.gob.mx/interactivos/recorridos-virtuales> 118 Miyotl. <https://proyecto-miyotl.web.app/#hero>.

SCIENTIFIC DIMENSION AND EDUCATIONAL

This third section discusses the state of artificial intelligence research, the challenges of innovation, and the progress and what remains to be done in the field of education. In general, the indicators and comparative studies reviewed reveal a lag in these areas, which do not reflect the size of the Mexican economy or its wealth of physical and human capital.

RESEARCH AND INNOVATION

The Global Innovation Index 2023¹¹⁹ is based on 80 indicators to assess seven pillars of technological innovation in 132 countries. In this index, Mexico ranks 45th in creative production, which includes the export of creative services and the creation of mobile applications; 57th in knowledge creation, which includes the number of patents, scientific articles, labor productivity growth, and the complexity of exported products; and 79th in the sophistication of private enterprise, which includes the percentage of women with postgraduate degrees in the labor market, collaboration between academia and industry, and payments for intellectual property.

Despite being the leader in public investment in research and development in Latin America, with \$5.318 billion in 2021,¹²⁰ Mexico has experienced a decline in public spending on information and communications technologies (ICT), falling 23.7% from 2018 to 2022 in real terms. The 2023 budget for this item, although increased by 21.8%, is still lower than that of 2018. What's more, by mid-2023, barely a third of the budget approved for that year had been collected.¹²¹

In relative terms, Mexico lags behind in total spending (public and private) on research and development. According to the Ibero-American Network of Science and Technology Indicators (RICYT) indicator for 2021, Mexico's spending on research and development was 0.28% of GDP, compared with an average of 0.56% for the Latin American and Caribbean region¹²² and an average of 2.72% in OECD member countries¹²³.

According to the Government AI Readiness Index 2023, Latin America continues to lag in its technological innovation capacity. Mexico scores 39.55 on the index, ranking third in the region (Brazil first with 45.08)¹²⁴.

Neither the 2023 Federal Expenditure Budget nor the LGMHCTI mention artificial intelligence.

However, according to the document "Mexican Talent for Growth and Relocation by the Mexican Government," the country has the Fiscal Incentive for Research and Development of Technology (EFIDT), which provides a tax credit equivalent to 30% of the company's research and development expenses and investments in the three previous fiscal years and, from 2019 to 2022, boosted private sector investment of more than 23 billion pesos. This incentive is applicable to AI¹²⁵ projects.

¹¹⁹ World Intellectual Property Organization (2023). Global Innovation Index 2023. https://www.wipo.int/global_innovation_index/en/2023/

¹²⁰ National Center for Artificial Intelligence (2023). Latin American Artificial Intelligence Index. <https://indicelatam.cl>

¹²¹ Social Intelligence Unit (2023). Overview of the Public Budget for ICT in Mexico. <http://www.the-siu.net/wordpress/wp-content/uploads/2023/08/The%20SIU-Panorama%20Presupuesto%20TIC%20M%C3%A9xico%202023%20v05.pdf>

¹²² RICYT (2023). Indicators for Mexico. http://app.ricyt.org/ui/v3/comparative.html?indicator=GASTOxPBI&start_year=2012&end_year=2021

¹²³ OECD (2023). Gross domestic spending on R&D (indicator). doi: 10.1787/d8b068b4-en <https://data.oecd.org/rd/gross-domestic-spending-on-rd.htm>

¹²⁴ Oxford Insights (2023). Government AI Readiness Index. <https://oxfordinsights.com/wp-content/uploads/2023/12/2023-Government-AI-Readiness-Index-1.pdf>

¹²⁵ Mexican Talent for Growth and Relocation (2023) Ministry of Economy, in collaboration with the Ministry of Public Education, the Ministry of Labor and Social Welfare, and the National Council for the Humanities, Sciences, and Technologies. First version, April 2023.

Regarding scientific research, according to the OECD, 4,277 publications on AI research were published in Mexico in 2022. 126 This is equivalent to 0.00353 publications per 100 people.

The per capita figure is comparable to that of other Latin American economies, but is well below the European average or the figure for the United States, which are approximately 10 times higher.

The Latin American AI Index (ILIA)¹²⁸ includes a research, adoption, and development dimension that measures the progress of this ecosystem in the evaluated countries. In terms of the number of academic publications per capita, Mexico ranks fifth, behind Chile, Ecuador, Brazil, and Uruguay, while it ranks fourth in citations to AI-related publications per capita, after Chile, Uruguay, and Brazil¹²⁹. Of the articles accepted for the FAccT 2023 conference, none are from authors or research centers located in Mexico¹³⁰.

Figure 11. ILIA innovation and development indicators

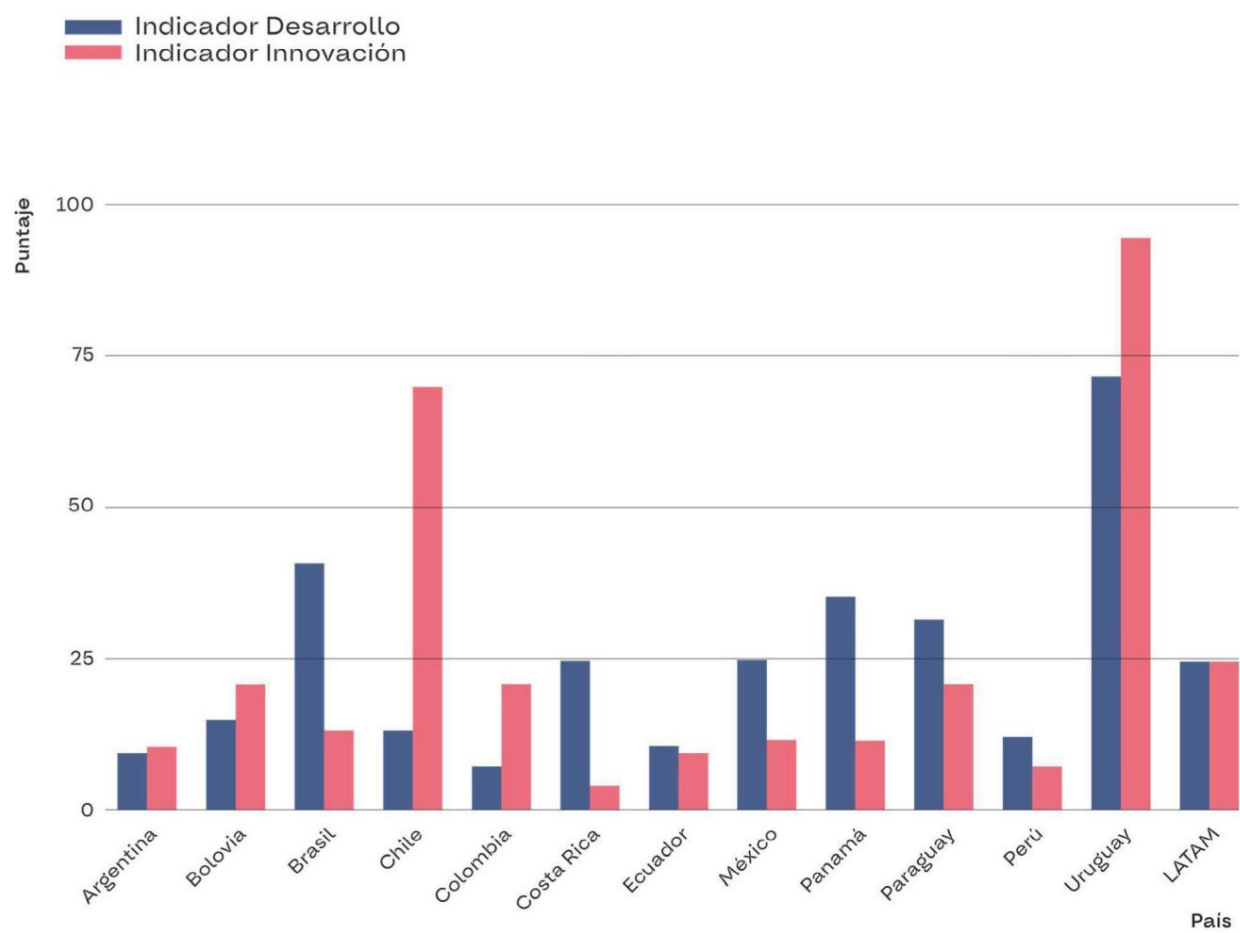


Gráfico C.7 : Indicadores Innovación y Desarrollo / Fuente ILIA 2023

Taken from: Latin American AI Index

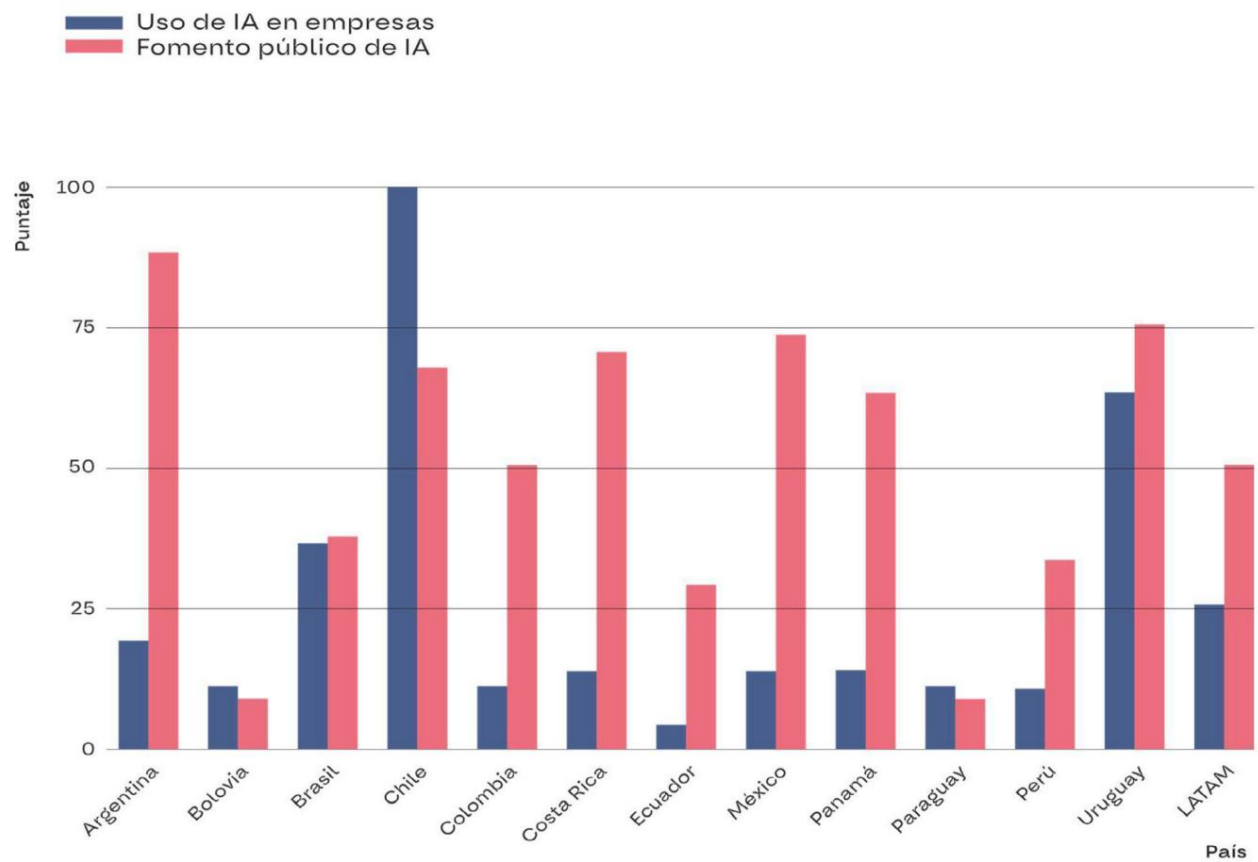
126 OECD.AI. Visualizations powered by JSI with data from OpenAlex. <https://oecd.ai/en/data?selectedArea=ai-research> 127 Ibid.

128 National Center for Artificial Intelligence (2023). Latin American Artificial Intelligence Index. <https://indicelatom.cl>

129 Ibid.

130 FAccT Conference 2023. Accepted Papers. <https://factctconference.org/2023/acceptedpapers>

Figure 12. ILIA adoption and promotion indicators



Taken from: Latin American AI Index

The first laboratory in Latin America dedicated to generative AI was inaugurated in 2024 in Guadalajara. This is a collaboration between Wizeline and the Tecnológico de Monterrey Guadalajara Campus, and focuses on the ethical use of this technology.¹³¹ Another important institution is the Computing Research Center of the National Polytechnic Institute, which has an Artificial Intelligence and Scientific Computing laboratory.

Some of the AI research centers and departments in Mexico that also consider the topic in some way of AI ethics are:

- Institute of Applied Sciences and Technology (ICAT)
- Department of Electrical Engineering of the Autonomous Metropolitan University (UAM)
- Institute for Research in Applied Mathematics and Systems (IIMAS) of the National Polytechnic Institute (IPN)
- Center for Systems Control and Artificial Intelligence of the University of Guadalajara (UdeG)
- Advanced Artificial Intelligence Research Group at the Monterrey Institute of Technology
- The Research Line in Artificial Intelligence of the Legal Research Institute of the UNAM, which also has a Permanent Seminar on Artificial Intelligence and Law: "Promoting the public agenda of Intelligence "Artificial in Mexico."

¹³¹ Wired. This will be the first artificial intelligence lab in Latin America and is located in Mexico. <https://es.wired.com/articulos/este-sera-el-Latin-America's-first-artificial-intelligence-laboratory,-and-it's-in-Mexico>.

¹³² National Polytechnic Institute. Laboratory of Mathematical and Computational Sciences. <https://www.cic.ipn.mx/>

Numerous universities offer programs in AI. Some of them mention AI ethics even if it's not the main focus.

An example is the UNAM course entitled: "Sixty Years of Artificial Intelligence," which can be taken through the educational platform Coursera¹³³.

Regarding Mexican talent dedicated to artificial intelligence, the Latin American AI Index indicates that Mexico ranks sixth in researchers working specifically in AI, after Chile, Ecuador, Brazil, Uruguay, and Colombia.

According to the OECD, the increase in the concentration of AI talent in Mexico from 2021 to 2022 was 45%, while in Brazil it was 47% and in Chile it was 54%.¹³⁴

According to the Latin American Artificial Intelligence Index, Mexico and Brazil hold 95% of the region's AI patents.

EDUCATION

The General Education Law, which includes digital education, served as the basis for the creation of the Digital Education Agenda in 2020 by the Ministry of Public Education. This agenda focuses on connectivity, the modernization and expansion of the ICTCAD (information, communication, knowledge, and digital learning technologies) infrastructure, as well as the implementation of artificial intelligence and other technologies to strengthen educational options and improve the use of digital platforms.

To date, no evaluation of the effectiveness of this digital education policy has been conducted, nor are there specific laws or evaluations on training educators in ethics applied to technology or artificial intelligence.

However, there are some initiatives in this field. For example, in August 2023, UNAM formed a working group focused on the use of generative artificial intelligence in teaching. This group aims to explore its potential in teaching, learning, and assessment and produced a document with recommendations for educators to leverage these tools, highlighting the importance of avoiding bias and discrimination, as well as understanding the challenges related to privacy and the specific uses of AI in teaching practice. It also offers a program of AI courses that address not only the technical aspects but also the ethics and social impact of the technology. These initiatives reflect a growing interest and commitment to incorporating ethics and artificial intelligence into higher education in Mexico.

On the other hand, the Monterrey Institute of Technology implemented a pilot program in 2023 that integrates AI into 21 training units, with an emphasis on digital search, critical thinking, and scientific ethics. Meanwhile, the National Institute of Public Administration has developed a Diploma in Public Innovation that includes more than 40 hours of training on the socio-technical challenges and opportunities presented by artificial intelligence, training more than 100 public servants in the field.

In Mexico, the integration of technology into education has been advancing. According to 2021 data from UNESCO, internet access in primary schools for educational purposes reached 29.61%, while in secondary and high schools it was 54.55% and 44.21%, respectively. Regarding computers for educational purposes, access in primary schools was 47%, in secondary schools 83.71%, and in high schools 70.27%.¹³⁷ However, schooling levels remain low; in the last 20 years, the average schooling only increased from 7.5 to 9.7 years.¹³⁸

In contrast, at the higher education level, Mexico is the OECD country with the second highest number of engineering graduates, and 25% of those who earned a bachelor's degree did so in STEM fields (the OECD average is 25.3%). It is the American country with the highest proportion among OECD members,¹³⁹ above Chile, Canada, the United States, Poland, and Spain.

¹³³ Coursera. Sixty Years of Artificial Intelligence. <https://www.coursera.org/learn/sesenta-anos-inteligencia-artificial?specialization=inteligencia-artificial>

¹³⁴ The oecd.ai site defines AI talent as the percentage of LinkedIn accounts where the account holders indicate AI skills or engage in AI-related activities. It's important to consider gender and other biases that impact self-perceptions of skills, especially technological ones.

¹³⁵ Latin American Artificial Intelligence Index, 2023, National Center for Artificial Intelligence. <https://indicelatam.cl/>

¹³⁶ Senate of the Republic (2020). [ADE.mx](https://ade.mx) Digital Educational Agenda. https://infosen.senado.gob.mx/sgsp/gaceta/64/2/2020-02-05-1/assets/documents/Digital_Education_Agenda.pdf

¹³⁷ UNESCO Institute for Statistics. Indicators 4.a.1. <http://sdg4-data.uis.unesco.org/>

¹³⁸ Ministry of Economy (2023). Mexican Talent for Growth and Relocation. https://www.gob.mx/cms/uploads/attachment/file/828154/talento-mexicano_esp.pdf

¹³⁹ Ibid.

In the 2021-2022 school year, 169 thousand undergraduate and graduate students graduated in STEM subjects, with a predominance in engineering, manufacturing and construction (70.6%), although only 17.6% in information and communication technologies¹⁴⁰.

In terms of the number of graduates from master's programs in computer science or equivalent, Mexico has the highest number in Latin America, with 2,670 in 2020, followed by Colombia with 2,345,141,142.

According to the SEP, only 3.4% of postgraduate graduates in the 2021-2022 cycle did so in ICT areas¹⁴³, but the Latin American Artificial Intelligence Index indicates that there are already four master's programs in AI in Mexico¹⁴⁴.

Select reports that, as of November 2023, there were 680 students pursuing a specialty in AI. 51% were enrolled at an institution in Mexico City (CDMX), 16% in Aguascalientes, 11% in Tlaxcala, and 9% in Veracruz. ¹⁴⁵ It also indicates that, since 2012, 262 students have graduated from AI programs, the majority from Nuevo León, Aguascalientes, and Veracruz.

From 2021 to 2022, 407,000 students graduated from 246 upper secondary technical and technological education programs. Of these, 21% (124,000) are from programs such as programming, computer support, and systems maintenance. 8% (55,000) are from electromechanics, automotive industry, engines, and industrial maintenance. In postgraduate studies, 451,000 students graduated. Mexico is the fourth OECD country with the highest number of enrolled students (3.1 million) and the third with the most graduates in professional and postgraduate studies.

On the other hand, although there is no record of all programs that offer a module or subject on digital anthropology, philosophy of technology, or AI ethics, there are some educational programs that combine technical and ethical aspects of AI, such as the AI specialization offered by ISDI Mexico, which has gender parity among its faculty.

Meanwhile, UNAM is implementing initiatives that include courses on AI ethics. The approach is designed to encourage students to think about the potential ethical and social impacts of the technology.

AI engineering programs at some other universities include courses on AI ethics, for example, in the artificial intelligence engineering program at Ibero León.¹⁴⁷ Others include courses on human rights or social justice in their programs, such as the artificial intelligence engineering program at the Marist University of Guadalajara.¹⁴⁸ However, some prominent programs do not include any humanities or ethics components and are entirely focused on technical training. For example, the program at the National Polytechnic Institute.¹⁴⁹

There are also some digital skills programs geared toward girls, boys, and adolescents, and toward basic education.

The IFT has launched a Digital Literacy Program since 2022, targeting this population, as well as older adults; people with disabilities; teachers; girls, adolescents, and women; telecommunications users; and entrepreneurs and MSMEs.

The [learn.mx](https://www.learn.mx) program The Ministry of Public Education has offered courses on digital skills and artificial intelligence aimed at teachers and the use of technology in the classroom¹⁵¹.

According to Coursera's 2023 Global Skills Report , Mexico ranks 25th in data science, business, and technology, achieving a very high level of proficiency in data science (90%), and in probability and statistics, data management, and mathematics skills. In Latin America, Mexico ranks second in data science, after Brazil. The report also notes that Mexican students show a strong interest in this subject. In 2022, the number of Mexican students taking data science courses on Coursera increased by 20%.

¹⁴⁰ Ibid.

¹⁴¹ National Center for Artificial Intelligence (2023). Latin American Artificial Intelligence Index. <https://indicelatam.cl>

¹⁴² To make a more accurate comparison, the population size in each country would have to be considered.

¹⁴³ Ministry of Economy (2023). op.cit.

¹⁴⁴ National Center for Artificial Intelligence (2023). op. cit.

¹⁴⁵ ConsumoTIC (2023). Technology. Moderate growth of AI professionals in Mexico. <https://consumotico.mx/tecnologia/discreto-growth-of-AI-professionals-in-Mexico/>

¹⁴⁶ Ministry of Economy. (2023). op.cit.

¹⁴⁷ Universidad Iberoamericana León. Program in Artificial Intelligence. <https://www.iberoleon.mx/programa/inteligencia-artificial>

¹⁴⁸ Marist University of Guadalajara. Artificial Intelligence Engineering. <https://umg.edu.mx/portal/ingenieria-en-inteligencia-artificial/>

¹⁴⁹ National Polytechnic Institute. Artificial Intelligence Engineering. <https://www.ipn.mx/oferta-educativa/educacion-superior/ver-carrera.html?lg=es&id=68&name=Artificial-Intelligence-Engineer>

¹⁵⁰ IFT (2023). Digital Literacy Program 2023. <https://www.ift.org.mx/usuarios-y-audencias/programa-de-alfabetizacion-digital-2023>

¹⁵¹ Learn.mx. <https://mexicox.gob.mx/courses>

¹⁵² Coursera. Global Skills Report 2023. <https://www.coursera.org/skills-reports/global/>

There are also some technical AI courses aimed at the general public. For example, UNAM created a series of eight introductory courses on artificial intelligence, which are free and in Spanish. They cover topics such as the history and ethical and philosophical implications of AI and are open to the public through Coursera.

Since its inception, the National Alliance for Artificial Intelligence (ANIA) has begun organizing workshops focused on increasing information and learning regarding AI. For example, in November 2023, it held the workshop on "Artificial Intelligence Applied to MSMEs," organized jointly with the National Chamber of the Electronics, Telecommunications, and Information Technology Industry (CANIETI), and the workshop "Artificial Intelligence Training for Women," in conjunction with CANIETI and IdeaTIC¹⁵⁴.

However, these efforts are not articulated or focused, and medium- and long-term institutional commitments are lacking, which explains why, in the Global Innovation Index 2023, Mexico was ranked 63 out of 132 in education, a measurement that includes indicators such as public spending on education, enrollment in higher education, and spending on research and development, although it does not specifically consider the use of technologies in education¹⁵⁵.

¹⁵³ Coursera. Artificial Intelligence Specialization. <https://www.coursera.org/specializations/artificial-intelligence?>

¹⁵⁴ ANIA (2023). Workshops. <https://www.ania.org.mx/services-2>

¹⁵⁵ World Intellectual Property Organization (2023). Global Innovation Index 2023. https://www.wipo.int/global_innovation_index/in/2023/
<https://www.wipo.int/edocs/pubdocs/en/wipo-pub-2000-2023-en-main-report-global-innovation-index-2023-16th-edition.pdf>

ECONOMIC DIMENSION

The fourth dimension of the RAM refers to the country's state of readiness with regard to labor markets and the artificial intelligence sectors recorded in intermediate consumption, investment, and production.

LABOR MARKETS

In Mexico, there is no strategy to prepare for and address the anticipated transformation of labor markets with the widespread application of AI and the accompanying automation and robotization processes.

The National Employment Service, through its Employment Portal, optimizes job searches with an artificial intelligence engine based on the academic and work experience, geographic location, and interests provided in the application.

By 2022, it had served more than 5.2 million visits, with vacancies from 32,000 companies and 259,917 placements.¹⁵⁶

Some educational centers offer a dual education model at the secondary and higher education levels, in which students engage in learning activities both at school and in companies. The goal is to develop specialized skills for the productive sector and reduce labor market entry costs. This model can be applied to update skills for jobs transformed and generated by AI.

Data sources on the number of people working as AI specialists, those who work with AI systems, or whose jobs have been affected by the existence of such systems are scarce. However, some figures can be reported from existing sources and new statistics collected from non-traditional sources, such as job boards.

Using microdata from the 2023 National Occupation and Employment Survey (ENOE), INEGI estimated that there were 361,465 people working as software and multimedia developers and analysts, representing 0.618% of the employed population; and 12,756 people employed as database and computer network administrators, representing 0.022% of the same population.

The OECD used data from the LinkedIn platform to estimate the penetration of AI-related skills in different countries, using the number of people who list these skills on their profiles as a proxy. Despite the limitations of this methodology, the figures can be used as an indication of the level of interest in these skills in the labor markets. According to these data, Mexico has an AI penetration level that reaches 49% of the average observed in the member countries of this organization. ¹⁵⁸ Regarding the concentration of AI talent, defined as the percentage of LinkedIn accounts whose owners indicate AI skills or who perform related activities, Mexico registered 1% in 2022. This figure shows a 45% increase in the concentration of AI talent from 2021 to 2022, a visible growth but still below countries like Brazil and Chile.

¹⁵⁶ Government of Mexico. Employment Portal. www.empleo.gob.mx, <https://www.gob.mx/stps/prensa/el-portal-del-empleo-cuenta-con-soluciones-smart-digital-to-find-work?idiom=es>

¹⁵⁷ Own estimates based on ENOE microdata. <https://www.inegi.org.mx/programas/enoe/15ymas/#microdatos>

¹⁵⁸ [OECD.AI](https://oecd.ai/). Visualizations powered by JSI with data from LinkedIn. <https://oecd.ai/>

INTERMEDIATE CONSUMPTION

Intermediate spending on AI services is not accounted for, but spending on information services in 2018 (the latest year for which the OECD reports) was 7.74% of total intermediate spending¹⁵⁹.

INVESTMENT AND PRODUCTION

Regarding venture capital invested in artificial intelligence, it was \$266 million in 2022 and \$150 million in September 2023. 160 Of the venture capital invested in 2023, approximately \$170 million will be allocated to the food and beverage industry, \$30 million to support processes and services, and approximately \$2 million to education and training.

According to the 2023 Latin American AI Index, Mexico received inbound investments worth \$508 million annually, a high amount for the region. However, once the data is adjusted for country size, Mexico falls far behind the average.

On the other hand, the classification used by the National Accounts System allows us to know the GDP corresponding to the following activities, in millions of pesos at current prices¹⁶².

Table 1. GDP by activity, millions of pesos at current value

ACTIVITIES	2021	2022*
Computer systems design and related services	30,691	34,439
Administrative, scientific and technical consulting services	42,650	53,928
Scientific research and development services	30,967	33,153

*preliminary

According to the Global Innovation Index, 14.2% of Mexico's total exports are high-tech exports, placing the country number 9 in the world.

159 OECD. Going Digital Toolkit. <https://goingdigital.oecd.org/indicator/02>

160 OECD.AI. Visualizations powered by JSI with data from Preqin. <https://oecd.ai/en/data?selectedArea=investments-in-ai-and-data&selectedVisualization=vc-investments-in-ai-by-country>

161 National Center for Artificial Intelligence (2023). Latin American Artificial Intelligence Index. <https://indicelatam.cl>

162 INEGI. National System of National Accounts. <https://www.inegi.org.mx/temas/pib/>

163 World Intellectual Property Organization (2023). Global Innovation Index 2023. https://www.wipo.int/global_innovation_index/in/2023/

TECHNICAL DIMENSION AND INFRASTRUCTURE

This final section of the diagnosis addresses the state of the country's infrastructure, connectivity, standardization, computing capabilities, and statistical performance.

INFRASTRUCTURE AND CONNECTIVITY

In Mexico, significant progress has been made in technological infrastructure and digital adoption, although certain challenges remain. As of December 2022, the IFT reported that there were 93 mobile lines with internet service and 106 mobile lines with telephone service per 100 inhabitants.¹⁶⁴ This contrasts with the 97 mobile service subscriptions per 100 inhabitants recorded in 2018, according to figures from the International Telecommunication Union (ITU).

In terms of supercomputing and robotics, Mexico presents a limited outlook. According to the Latin American AI Index, the country has only one supercomputer¹⁶⁶, and according to the International Federation of Robotics, 5,400 industrial robots were installed in Mexico in 2021¹⁶⁷.

In the area of internet access, The Economist's Inclusive Internet Index 2022 ranked Mexico 52nd out of 100 in availability, evaluating the quality and coverage of the infrastructure necessary for internet access¹⁶⁸. As of December 2022, 26.1 million fixed internet accesses were recorded, representing a 6.2% annual increase compared to December 2020. This translates to 70 fixed internet accesses per 100 households in 2022, compared to 38 accesses per 100 households in June 2013¹⁶⁹.

Mobile broadband has also experienced significant growth. Data from the ITU (2022)¹⁷⁰ and the IFT (2022)¹⁷¹ indicate that 96.1% and 93.3% of the population, respectively, have coverage by at least one 3G mobile network. The ITU reported that in 2022, 88% of the Mexican population had an active mobile broadband subscription.¹⁷²

Regarding internet speed, Ookla's Q2 2023 report indicated that the average fixed broadband download speed in Mexico was 60.71 Mbps, an increase of approximately 30.7% compared to the same period in 2022.¹⁷³ However, this figure is still lower than the OECD average of 119 Mbps.

164 IFT (2023). Press Release 72/2023. <https://www.ift.org.mx/comunicacion-y-medios/comunicados-ift/es/las-lineas-del-servicio-movil-Internet-access-increased-by-103-million-in-one-year-press-release-722023>

165 International Telecommunication Union. ICT Statistics; Digital Development. <https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>; <https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx>

166 National Center for Artificial Intelligence (2023). Latin American Artificial Intelligence Index. <https://indicelatam.cl>

167 Stanford HAI. AI Index 2023. https://aiindex.stanford.edu/wp-content/uploads/2023/04/HAI_AI-Index-Report_2023.pdf

168 The Economist. Even Internet Index. <https://impact.economist.com/projects/inclusive-internet-index/>

169 IFT (2023). op.cit.

170 ITU (2022). Data Hub. <https://datahub.itu.int/data/?i=100095&e=MEX>

171 IFT (2023, July 20). Quarterly report on mobile service coverage and quality.

172 ITU (2022). Digital Development Dashboard Mexico. Accessed at: <https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx>

173 Ookla. (2023). Speedtest Intelligence: Q2 2023 Mexico. <https://www.speedtest.net/reports/mexico/>

In 2017, Mexico's total international bandwidth usage was estimated at 3 million Mbit/s, the latest year for which ITU-T174 has data.

In terms of internet users, ENDUTIH estimated that in 2022 there were 93.1 million internet users in Mexico, representing 78.6% of the population aged 6 years and older, an increase of 3.0 percentage points compared to 2021.

The gender gap in internet access measured by this survey is not very large, since 78.1% of women and 79.3% of men aged 6 and older used the internet in 2022.

In contrast, the Inclusive Internet Index, which uses a concept of meaningful internet access, reports a gender gap of 20.8 percentage points in internet access, which places the country in 77th place out of 100 in equality of access¹⁷⁵.

Furthermore, there is a notable disparity in internet access between urban and rural areas: 83.8% of the urban population compared to only 62.3% in rural areas. ¹⁷⁶ According to the 2020 population census, 21% of the population is rural and 79% urban. ¹⁷⁷

Regarding coverage of basic services, the World Bank reported that in 2023, 99.2% of the Mexican population had access to electricity¹⁷⁸, leaving 0.8% of the population, mainly in rural areas of states such as Chiapas, Guerrero and Oaxaca, without this service.

In the Online Services Index, Mexico ranks 62 out of 193 in e-government development and 32 out of 193 in digital participation¹⁷⁹.

STANDARDIZATION

Mexico is an observer member of the ISO committee for artificial intelligence¹⁸⁰, and has the Quality Infrastructure Law¹⁸¹, which regulates standardization, accreditation, conformity assessment, and metrology activities, in order to expand productive capacity and continuous improvement in value chains.

Following the law, the National Quality Infrastructure System was created, which coordinates technical regulations and standards for implementing and promoting their use.

COMPUTING CAPABILITIES

Mexico does not have a specific policy for cloud computing with its own services or supercomputing programs, so the closest source on the topic is the IFT microsite called Hybrid Cloud¹⁸², which provides guidance and recommendations for adopting this technology.

Regarding computing capacity, the 2022 report "Data Centers in Mexico" indicates that there are 36 ICREA-certified data centers¹⁸³, which is equivalent to less than one center (0.28) per million inhabitants. And according to Cloudscene,

¹⁷⁴ This measurement refers to the average use of all international links, including optical fiber, radio frequencies and traffic processed by satellite ground stations and teleports to orbital satellites (expressed in Mbit/s) <https://datahub.itu.int/data/?i=242&e=MEX>

¹⁷⁵ The Economist. Even Internet Index. <https://impact.economist.com/projects/inclusive-internet-index/>

¹⁷⁶ IFT (2023). Press release: National survey on the availability and use of information technologies in households. <https://www.ift.org.mx/sites/default/files/comunicacion-y-medios/comunicados-ift/comunicadoendutih2022.pdf>

¹⁷⁷ INEGI. 2020 Population and Housing Census. <https://www.inegi.org.mx/programas/ccpv/2020/>

¹⁷⁸ World Bank (2023). Access to electricity (% of population), <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS>

¹⁷⁹ AN e-Government Knowledgebase. Mexico. <https://publicadministration.un.org/egovkb/en-us/Data/Country-Information/id/110-Mexico>

¹⁸⁰ International Organization for Standardization. ISO/IEC JTC 1/SC 42 Participation. <https://www.iso.org/committee/6794475.html?view=participation>

¹⁸¹ Quality Infrastructure Law. https://www.diputados.gob.mx/LeyesBiblio/pdf/LICaI_010720.pdf

¹⁸² IFT. Hybrid Cloud. <https://nubehibrida.ift.org.mx/>

¹⁸³ Bilbao, L., (2022), Economic and Commercial Office of Spain in Mexico. Data Centers in Mexico. <https://www.camarabilbao.com/wp-content/uploads/2023/03/DATA-CENTERS-Ficha-del-sector-Data-Centers-M%C3%A9xico-2022.pdf>

There are 166 data centers in total, which represents less than one center (0.28) per million inhabitants.^{184,185} According to a report by Aritzon, there are 32 colocated data centers in Mexico.¹⁸⁶ The MIT Global Cloud Ecosystem Index 2022 places Mexico in 60th place out of 72 with a score of 3.0 in the data center pillar.¹⁸⁷

STATISTICAL PERFORMANCE

According to the World Bank's statistical performance indicators, Mexico stands out for the maturity and performance of its national statistical services, with a score of 87.5, placing the country in the top quintile of the nations evaluated worldwide and first among Latin American countries. The score was 89 for data products.¹⁸⁸ The country achieved 80 points for data sources and 75 for infrastructure.

Mexico has a National Statistical and Geographic Information System (SNIEG) Law that defines the organization and operation of this system, which produces the country's official statistics. According to Article 3 of the law, the SNIEG "...has the purpose of providing society and the State with quality, relevant, accurate, and timely information, in order to contribute to national development. The guiding principles of the System shall be accessibility, transparency, objectivity, and independence."¹⁸⁹ The SNIEG is coordinated by the INEGI, a specialized autonomous public agency.

The International Monetary Fund published its assessment of compliance with standards and codes in Mexico's national accounts, financial statistics, and balance of payments by the SNIEG and INEGI in December 2021, obtaining generally good results, with some observations such as the lack of publication by administrative units of the public sector and some inconsistencies in data on financing and debt of states and municipalities.

There is also the peer review carried out by the OECD on the application of the recommendations of the same statistical good practices body in Mexico¹⁹¹, which concludes that the country has a highly developed legal and institutional framework for statistics, with significant governance to ensure the professional independence of its governing body and staff, as well as its statistical products.

INEGI has annual quality assurance programs for its statistical products and makes its principles, processes, standards and related guides available to the public.¹⁹²

¹⁸⁴ Statista. Melo, María (2023). The data center industry. <https://es.statista.com/grafico/28698/numero-de-centros-de-procesamiento-data-in-November-2022-in-selected-countries/>

¹⁸⁵ Data Center Map. <https://www.datacentermap.com/mexico/>

¹⁸⁶ Arizon. Mexico Data Center Market. https://www.researchandmarkets.com/reports/5750180/mexico-data-center-market-investment-analysis?gclid=Cj0KCQjwqP2pBhDMARisAJQ0Czpl-g_hRQNazNd_qAoY3Fkj6ww13gbK2FN1GG1goza8F3gjr2OBWoaArNFEALw_wcB#product--methodology

¹⁸⁷ MIT Technology Review (2022). The Global Cloud Ecosystem Index 2022. <https://docs.google.com/spreadsheets/d/1DjUfsihHolE806qLFYqCu-FAHrPWNXYX1NYjs73FXp8/edit#gid=288419984>

¹⁸⁸ World Bank. Statistical Performance Indicators. <https://www.worldbank.org/en/programs/statistical-performance-indicators/> ¹⁸⁹ Law of the National Statistical and Geographic Information System. https://sc.inegi.org.mx/repositorioNormateca/Lmj_SNIEG.pdf

¹⁹⁰ International Monetary Fund Statistics Department. Mexico: Report on the Observance of Standards and Codes. <https://www.elibrary.imf.org/view/journals/002/2021/277/article-A003-en.xml>

¹⁹¹ OECD (2018). Peer review of the implementation of the OECD Council Recommendation on Good Statistical Practice. <https://www.oecd.org/statistics/good-practice-toolkit/Peer%20review%20report%20on%20the%20Implementation%20by%20Mexico%20of%20the%20Recommendation%20of%20the%20OECD%20Council%20on%20Good%20Statistical%20Practice.pdf>

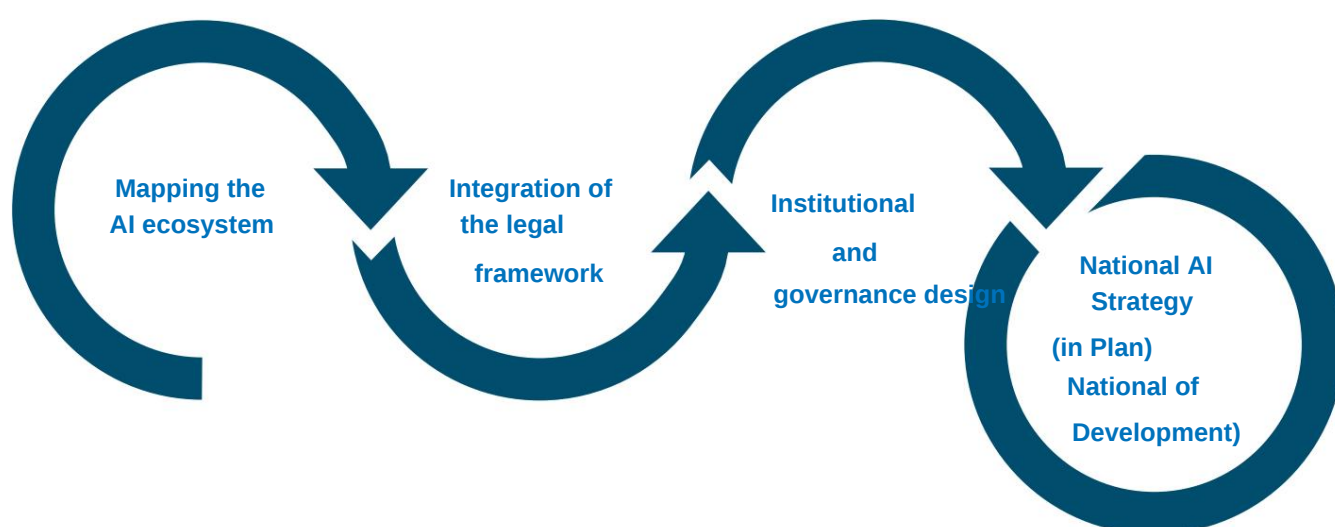
¹⁹² Material available at: <https://extranet.inegi.org.mx/calidad/normatividad-y-otros-documentos/>

RECOMMENDATIONS FOR THE PREPARATION OF A NATIONAL STRATEGY FOR ETHICAL DEVELOPMENT AND USE OF ARTIFICIAL INTELLIGENCE

The development of the RAM presented in this document provides a sufficiently clear picture of Mexico's strengths and challenges in terms of AI. This has been taken into account in compiling a list of recommendations grouped into four key components: 1) developing a functional map of the ecosystem in which AI resides and impacts; 2) integrating a legal framework for AI that leverages existing applicable regulations, while adapting them to the new demands of the AI ecosystem and creating new ones when necessary; 3) creating a new institutional and governance design for AI that meets the objectives and needs of public policies, innovating regulatory mechanisms, and involving different levels of government, academia, industry, and civil society in its decisions; and 4) issuance of the National Artificial Intelligence Strategy, as an integral part of the National Development Plan, which includes cybersecurity from its conception and is based on an inclusive, ethical, and human-centered approach, taking into account environmental sustainability, addressing new educational and labor demands, as well as promoting infrastructure.

It is important to highlight that these four components group all the recommendations listed in this section and that they have been arranged chronologically, as a process, as indicated in the diagram below:

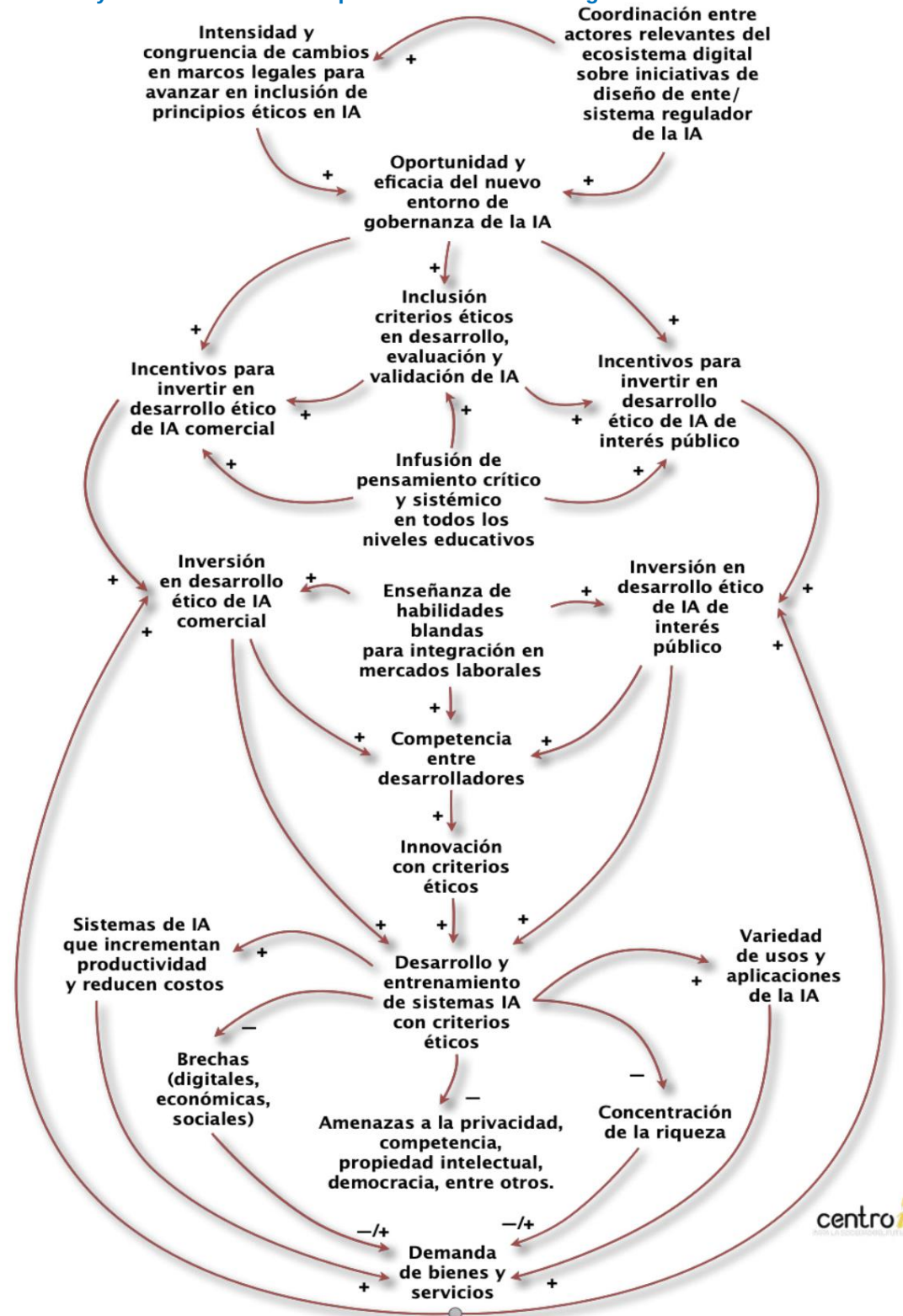
Figure 13. Flowchart of recommendations for the national AI strategy



Mapping the AI ecosystem is a necessary first step to visualize the set of relevant actors in the AI cycle and, of particular importance, to identify the relationships and interactions between all relevant actors. This initial challenge is fundamental to advancing our understanding of the functioning of the ecosystem in which the recommendations generated from the AMR will be applied. The effectiveness of the AI governance framework and the scope of the national AI strategy critically depend on knowledge of this functioning.

Figure 15 contains an ecosystem map of the generic AI governance environment, which serves as an example of the type of mapping being referred to. The map shows some of the direct and indirect impact chains that shape the decisions of critical actors, and which are worth considering when defining the recommendations and actions for the case, so that they are aligned and reinforced so that the system responds in the desired way.

Figure 14. Ecosystem of ethical development of artificial intelligence



Este mapa corresponde a una visión general centrada en el entorno de gobernanza de la IA. No se consideran los efectos en el tiempo.

Note on the interpretation of arrows and symbols on the map: The arrow indicates a sense of causality, running from the source element to the destination element. The algebraic symbols indicate the type of relationship between the elements. A (+) sign indicates that the aspects represented by the elements move in the same direction. A (-) sign indicates that the aspects represented by the elements move in the opposite direction.

Thus, a well-designed AI governance framework encourages the inclusion of ethical criteria in the development, evaluation, and validation of AI systems. This facilitates the creation of incentives that increase the development of ethical AI systems in the public interest. This increases competition among developers, promotes innovation, and increases the demand for AI goods and services, generating a virtuous cycle that increases investment in these types of systems. At the same time, some positive effects can be observed, such as improved AI training data, reduced data gaps, and eventually even reduced threats to privacy and intellectual property.

A framework like this makes it possible to visualize why ethical governance and responsible regulation are not only absolutely consistent with innovation and economic growth, but are both essential to ensuring an AI ecosystem that promotes the common good. The recommendations presented in this document focus on developing a model that is not limited to promoting economic growth per se as the sole measure of development, but is also open to considering other measures of population well-being so that they are recognized as more humane and lasting development objectives. The purpose is to align with a theory of change that does not replicate what has been observed on many occasions in different countries: periods of economic growth during which inequalities and socioeconomic, technological, and gender gaps increase, leading to crises that are not only economic, but also political and social.

In this context, innovation and regulation are concepts that have been at the center of heated debates about the best ways to promote the development of the digital ecosystem in general, and artificial intelligence in particular. It is often repeated in many forums that regulation should not hinder innovation, but what is often overlooked is that innovation is not the result of a single regulated activity and that, therefore, what is required are actions and institutional frameworks to create a regulatory environment that promotes ethical and responsible innovation.

Innovation is the result of a combination of conditions and activities carried out in various fields or sectors that are directly or indirectly interrelated, and that can feed off each other in virtuous cycles or counteract each other in vicious cycles. Some of these activities are potentially regulated and others are not, meaning that a certain regulatory combination may inhibit one type of innovation and another may increase it. This discussion will remain critical in the future. case of AI.

The following section presents the conclusions of the discussion panels, the suggestions of the experts consulted, and the perspectives of the Centro-i, which informed the recommendations. The table below summarizes the 24 main recommendations, which have been grouped into four chronological sections: map of the AI digital ecosystem, integration of the AI legal framework, institutional design and governance of AI, and national AI strategy.

MAIN RECOMMENDATIONS

Table 2. Summary of main recommendations

SECTION	RECOMMENDATIONS
1. AI ECOSYSTEM MAP	1.1 Map the AI ecosystem in Mexico.
2. INTEGRATE THE LEGAL FRAMEWORK OF AI	2.1 Identify the current standards that can be applied to AI, which ones should be appropriate, and which ones need to be created. 2.2 Raise awareness among various authorities and legal practitioners about the implications of AI and digital technologies in the interpretation of regulations. 2.3 Innovate in the design of agile regulatory instruments that respond to the dynamics of technological progress and contemplate mechanisms for learning and continuous improvement of regulation. 2.4 Define criteria for the ethical use of AI, regulating based on principles and risk management, and assessing the prohibition of certain AI systems that pose high risks to security and human rights.
3. INSTITUTIONAL AND GOVERNANCE DESIGN OF AI	3.1 Conduct an analysis of the advantages and disadvantages, benefits and total costs of each of the institutional schemes considered plausible, in order to choose the most appropriate one. 3.2 Create a multi-stakeholder governance system as a cross-cutting coordination axis with other state bodies and branches, the private sector, academia, and civil society, ensuring inter-institutional coordination and collaboration.
4. ISSUE THE NATIONAL AI STRATEGY	
4.1 CYBERSECURITY	4.1.1 Develop a cybersecurity regulatory framework that addresses authentication access management, privacy, and data protection. 4.1.2 Implement the single digital identity system operated by an independent body. 4.1.3 Identify critical assets and services, with specific prevention and detection strategies, as well as reaction plans appropriate to different circumstances, clearly differentiating national security from citizen security. 4.1.4 Create educational campaigns to explain how AI can be used to improve cybersecurity and how to improve the security of artificial intelligence systems themselves. 4.1.5 Propose economic incentives for small and medium-sized enterprises to comply with cybersecurity standards and certifications and to share information about cyberattacks. 4.1.6 Allocate sufficient public funding to ensure that public entities and services are cyber-secure and reliable.
4.2 ETHICS, RESPONSIBILITY, AND INCLUSION. AI IN THE PUBLIC INTEREST	4.2.1 Provide training on biases, gender perspectives, and human rights to all those involved in the different stages of the AI cycle. 4.2.2 Define public policies to reduce digital violence against women and other vulnerable groups and prevent the hypersexualization of women and girls through AI and GAI (generative artificial intelligence). 4.2.3 Assess the application of the European model for prohibiting AI systems that pose high risks to human rights. 4.2.4 Analyze the effects of the use of artificial intelligence in political campaigns. 4.2.5 Apply AI to improve access to public services.
4.3 EDUCATIONAL UPDATE AND JOB RETRAINING	4.3.1 Design a policy to address the changes generated in labor markets by the emergence of AI and IAG. 4.3.2 Include courses on soft or socio-emotional skills and the benefits of complementary work skills in educational plans and programs, and provide accelerated training programs, as well as skills expansion and retraining programs for people already participating in the formal economy. 4.3.3 Design and deliver appropriate programs for people working in the informal economy, seeking new arrangements that guarantee labor rights for emerging forms of work. 4.3.4 Take advantage of the momentum of updating educational plans to transform the traditional curriculum with the infusion of critical and systemic thinking from basic education.
4.4 INFRASTRUCTURE	4.4.1 Apply a State policy to the country's digital transformation. 4.4.2 Align incentives to promote investment in infrastructure, facilitating public-private partnership schemes, under principles of technological neutrality and competition.

1. CREATE A MAP OF THE AI ECOSYSTEM

While this report brings together a series of recommendations to ensure Mexico has optimal governance for the ethical development of AI, it is essential to establish certain methodological principles to ensure an orderly and efficient incorporation of these recommendations into the design of the national digital strategy.

In this sense, the first recommendation is to map the digital ecosystem in which artificial intelligence resides and impacts, which means not only identifying the main elements that comprise it, but, above all, defining how they relate to each other and what the cascading effects chains might be generated by some of the proposed actions.

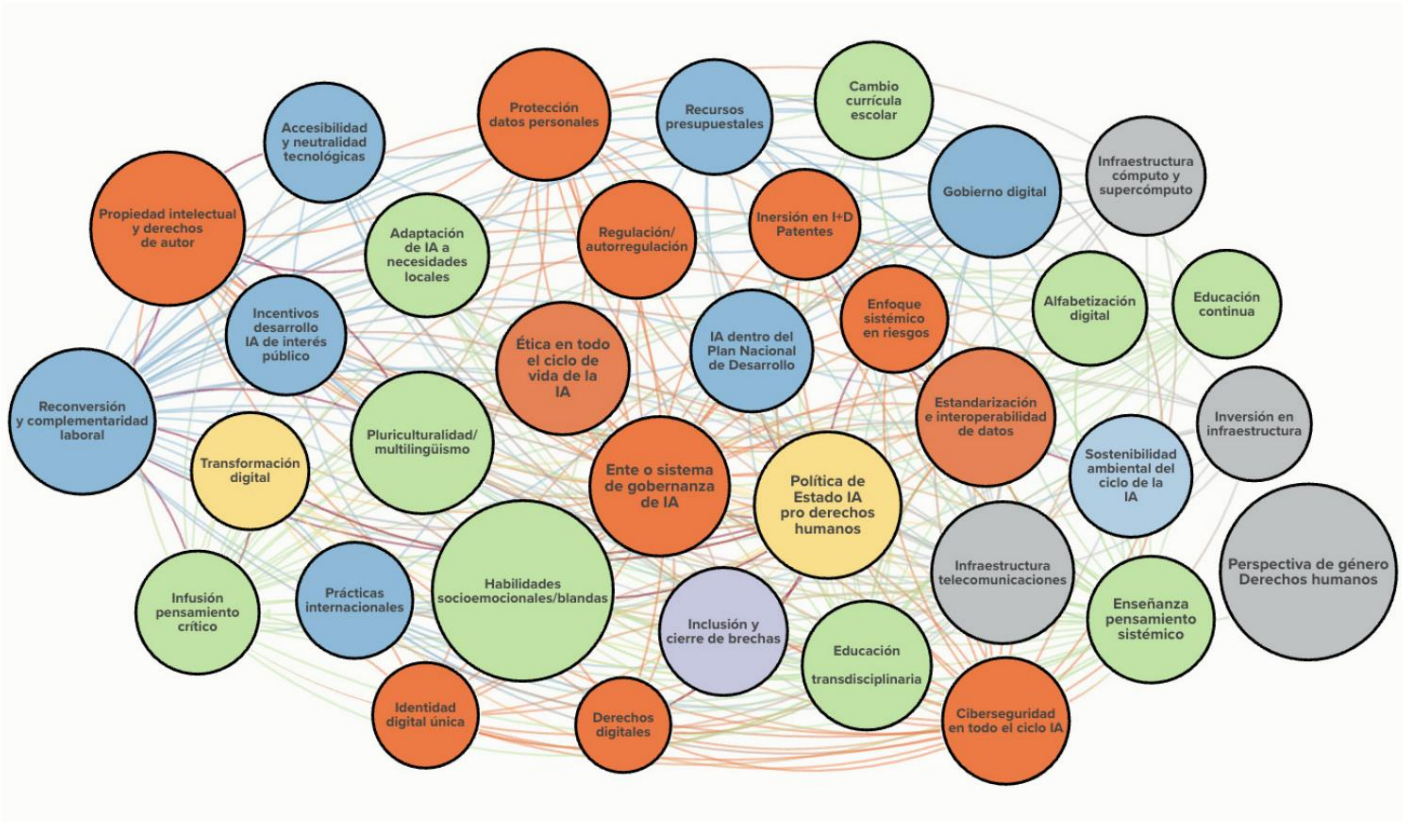
This is crucial to reducing adverse effects and ensuring that the net effects of the recommendations sum up to the expected results. This first recommendation is an opportunity to better understand how the recommendations work of the ethical AI development ecosystem.

There are, however, actions that may seem like priorities but in reality do not generate the desired effects on the system. For example, the eventual approval of legal and regulatory changes proposed by a wide variety of actors who do not share the same diagnosis or have the same interests alters the functioning of the system that defines the ethical development of AI but does not necessarily move it in the expected direction. Alternatively, the inclusion of the term artificial intelligence in some articles of existing laws and regulations is no guarantee that it will improve regulation on the subject or create the necessary incentives. For these initiatives to work, it is necessary to first understand the ecosystem in which they are embedded to ensure that they are necessary and appropriate actions for the intended purposes.

Creating a functional map of the AI ecosystem is a complex but necessary task for designing an effective strategy where actions are aligned and reinforce each other, anticipating the effects encountered and the resistance that will be faced.

Each of the recommendations fits into some of the points in the framework that gives structure and functionality to the AI ecosystem. The map shown in Figure 17 serves to highlight that the recommendations cannot be considered independently but rather as parts of the same ecosystem.

Figure 15: Elements to consider for the design of systemic strategies that promote the ethical development of artificial intelligence



Source: Centro-i for the Future Society. http://centroi.org/RAM-UNESCO_mapas_sistemicos_ia

1.1 Specific recommendations for mapping the AI ecosystem:

- Develop a methodology for mapping the AI ecosystem in Mexico.
- Form a working group that includes specialists in complex systems and representatives from the branches of government, the private sector, academia, and civil society to design and develop an AI ecosystem that represents the situation in Mexico.
- Design ecosystem metrics that are appropriate for measuring the performance of specific variables and processes of the AI ecosystem.

2. INTEGRATE THE LEGAL FRAMEWORK OF AI

AI requires a robust and consistent legal framework that envisions long-term, high-level objectives and contains specific, specialized, agile, and flexible instruments that can respond to a rapidly and continuously evolving ecosystem.

Designing and generating new regulations and public policy packages for AI does not necessarily imply creating a completely new regulatory framework. Instead, it is advisable to review existing provisions in different areas and reinterpret them in light of technological advances, proposing regulatory changes only where strictly necessary.

Of particular interest is the update of the framework applicable to personal data protection, transparency, and open government, to adapt it to the reality of artificial intelligence and evolve toward a data governance system.

Given its unprecedented scope and transformative potential, the development of AI compels us to review the history of the ICT revolution, its effects on multiple areas of life, and the regulatory and public policy approaches it has triggered.

In particular, the decentralized internet governance model serves as a useful reference. All of this serves as a reminder of the importance of acting proactively, immediately, and leveraging the existing framework, even in an environment of uncertainty.

An argument repeatedly mentioned in many forums is that regulation should not stifle innovation. What is often overlooked is that innovation is not the result of a single regulated activity. Innovation is the result of a combination of activities carried out in various fields or sectors that may or may not be markets. The point is that all these activities are potentially regulated, and that the degree and qualities of a given type of innovation are determined by the values and trajectories of a large number of interrelated variables. This implies that a certain regulatory combination can inhibit innovation, and another regulatory combination can enhance it.

A simple and clear example is given in the context of economic competition. The lack of adequate regulation in a market system can lead to an increase in monopolistic power in some markets, eliminating incentives to invest and innovate. The result is therefore counterintuitive to many: less regulation, less innovation.

Appropriate regulation, far from diminishing innovation, can actually increase it by generating certainty, adequate incentives, and trust in the technology and institutions that protect the rights of developers, businesses, workers, users, and society as a whole.

Innovation in the AI lifecycle can emerge at different stages and in different markets within the same ecosystem. The challenge is to innovate within the regulatory framework to design systemic regulatory strategies that create the conditions conducive to the desired innovation in the target sectors or markets.

2.1 Specific recommendations for integrating the AI legal framework:

- Identify the standards that can be applied to AI to promote its understanding and ensure that regulations, regulatory changes, and sanctions systems are not redundant and remain consistent.
- Once you understand the scope of existing standards for application to AI, determine which ones should be appropriate and which ones need to be created.
- Raise awareness among various authorities and legal practitioners about the implications of AI and digital technologies in the interpretation of regulations, both in terms of the scope of the concepts and the powers of government entities.
- Harmonize new concepts arising from the development of AI with the definitions, rights, and obligations of the existing constitutional framework. For example, with the right of access to technology provided for in Article 6 of the Constitution and the catalog of human, political, and social rights recognized therein.

- Innovate in the design of agile regulatory instruments that respond to the dynamics of technological advancement and include mechanisms for continuous learning and regulatory improvement, including sandboxes, guidelines and guides that can be revised modularly as needed, the definition of safe spaces for sharing experiences, etc.
- Regulatory strategies may include self-regulation schemes, which must be considered as functioning when placed within a framework of binding legal principles, obligations, and consequences.
- Define the framework for protecting intellectual property and copyright for the use of data and works in the training of AI systems, as well as the definition of copyright and intellectual property rights for works, developments, and inventions produced with the support of AI systems.
- Ensure that the legal liability framework is defined throughout the AI lifecycle.
- Define criteria for the ethical use of AI, regulating based on principles and risk management. Regulation should be tailored to the risks posed by specific AI-related activities to achieve a balance between risk mitigation and promoting responsible development and use of AI.
- Consider banning certain AI systems that pose high risks to security and human rights, particularly affecting vulnerable or historically discriminated groups, as established by the European model.
- Ensure that risk management processes and compliance requirements apply to the entire AI lifecycle, including requirements and conditions for system providers, those who process and manage data, those who design, promote, and use systems, especially when they are used in operations deemed critical.
- Consider the risks and challenges of regulating artificial intelligence, such as rights to exploitation and learning, bias, privacy and freedom of expression; discrimination and its serious impacts; as well as autonomy and freedom. Diversity is also considered a challenge here.
- Define or adapt concepts and terms used in the field of AI, considering both those proposed internationally and those published by ISO, making an effort to standardize concepts and definitions.
- Update the LFPDPPP and the LGPDPPSO, considering the implications and effects of data uses by AI and the possibility that they may be created by AI itself. It is important to adapt the concepts of data privacy and transparency, algorithms, and AI learning models, and also ensure that the concepts reflect the possibilities AI has to identify and re-identify people using AI and different databases.
- Generate a framework where users can maintain reasonable control of their data and explore ways of property that can be defined on them.
- Promote the necessary changes to expand the scope of open data, both for open government and so that the data used to train AI systems can be leveraged by companies and public administrations.

3. CREATE THE INSTITUTIONAL AND GOVERNANCE DESIGN FOR AI

Institutional design is one of the essential aspects of regulatory effectiveness.

Public policies, legal norms, principles, and criteria must be accompanied by institutions—that is, entities, authorities, processes, and mechanisms for connection and collaboration—that can channel regulatory frameworks.

New institutional arrangements for AI require innovation and creativity to design flexible, adaptable entities that can operate in changing environments with significant uncertainty. At the same time, they require highly fluid mechanisms for inter-institutional collaboration and transparency, grounded in multi-stakeholder governance frameworks.

These questions arise both within countries and globally, to determine whether specific authorities should be created, or whether powers should be granted to existing entities and, if necessary, redesigned. Likewise, questions arise as to whether the entities in charge should be strictly governmental or whether it is desirable to build multi-stakeholder governance schemes, and, therefore, what their composition and organization should be.

In the case of Mexico, several alternatives are proposed. One is the creation of a specialized entity that could have constitutional autonomy. Another is to assign responsibility to an existing public entity, such as the Federal Telecommunications Institute, or to establish a collaborative mechanism between different public authorities coordinated by an autonomous regulator or by an entity of the Federal Executive Branch.

An essential recommendation is that, before choosing a specific institutional design, an assessment of the advantages and disadvantages be conducted, considering the scheme that best responds to the regulatory and public policy framework that is intended to be built for AI.

In any case, it is crucial that the framework be based on certain basic principles, such as high levels of specialization, technical and management autonomy, regulatory powers, flexibility to adapt its objectives and actions to the evolution of AI, and that it involve different levels of government, academia and research centers, industry, major users, and civil society in its decision-making processes.

A reflection on the institutional model of the Mexican regulatory state and the creation of specialized autonomous regulators suggests moving away from vertical government schemes to support AI governance based on a multi-stakeholder system where there is collaboration among different government entities, industry, academia, social organizations, and users.

3.1 Specific recommendations for institutional and governance design:

- Conduct a comparative analysis, based on the map of the AI ecosystem in Mexico, of the advantages and disadvantages, benefits, and total costs of each of the institutional arrangements considered plausible. Include legal and legislative engineering aspects in the analysis; the efficiency of each alternative, considering the number and difficulty of the reforms and adjustments required; its effectiveness, in relation to its adaptation to the regulatory and public policy framework to be established; as well as the legal timeframes for each one, and the degree of difficulty in their implementation.
- Among the institutional arrangements being evaluated, consider at least: the creation of a specialized entity that could have constitutional autonomy; assigning responsibility to an existing public entity, such as the IFT; creating an inter-secretarial commission or comparable entity that could integrate autonomous constitutional bodies; creating a multi-stakeholder advisory commission with sufficient powers to influence the conduct of the national AI strategy; creating a coordinating entity from the Executive Branch; or a combination of the aforementioned.
- Grant the ultimately selected scheme technical and management autonomy, with the power to issue general administrative provisions, and to act as an authority on the matter and as a cross-cutting coordination axis with other state bodies and powers, the private sector, academia, and civil society, creating a multi-stakeholder governance system.
- Ensure diverse profiles within management bodies and across different functions and specialties (gender and age diversity, experts in technical and technological aspects, as well as in the humanities, ethics, inclusion, etc.)
- Include spaces for innovation and regulatory experimentation, which enrich continuous and iterative learning processes through trial and error for the different stages of the AI lifecycle, always with human rights protections. These may include sandboxes, modular regulations, continuous regulatory improvement, and agile regulation.
- Establish that it must promote technical standardization processes and certification based on ethical principles, transparency, and bias, as well as ethical impact assessments.
- Indicate the importance of maintaining continuous interaction with the scientific community.
- Any institutional design that is decided upon must ensure inter-institutional coordination:
 - With INEGI to design new indicators with a systemic approach and adapt existing ones related to AI.
 - With PROFECO on consumer rights related to AI, such as algorithmic transparency, interpretability and informed consent when accepting terms and conditions.
 - With the IFT and COFECCE on competition matters, for example, to prevent market concentrations as much as possible and address the consequences of concentration in various dimensions such as infrastructure, data and computing power, information asymmetries, barriers to entry, and the lack of interoperability of closed systems.

- With the IFT in the regulation and supervision of telecommunications and infrastructure.
- With the CDNH, CENAPRED, INMUJERES and INPI on matters of discrimination, inclusion, representation, non-consensual material, right to image and reputation, collective rights of indigenous populations, etc.
- With the INE on electoral propaganda and disinformation.
- With the INAI on matters of privacy and transparency.
- With the IMPI and INDAUTOR on intellectual property and copyright matters.
- With the Executive Branch in the use of AI for electronic government and public services, particularly those of social impact.
- With the legislative and judicial powers in the continuous study of the effectiveness and harmonization of public policy and jurisdictional positions in the matter.

4. ISSUE THE NATIONAL AI STRATEGY

The unprecedented acceleration that AI systems are bringing to the evolution of the digital ecosystem and the impact of their application in numerous areas of public and private life demands the immediate creation of a National AI Strategy as one of the main components of a National Digital Strategy that considers the AI ecosystem as one of its components. Given this context, the recommendations made in this section refer specifically to the National AI Strategy.

In this regard, a first recommendation is to include a section dedicated to the ethical development of AI in the national development plan, which is published at the beginning of each presidential administration.

The roadmap to ensure the ethical development of AI must emerge from a national strategy that recognizes the following as inseparable elements of AI development: cybersecurity and its interaction with privacy; its ethical and people-centered use; the transformation of the education system and the ways in which it connects with new work realities; the development of AI in the public interest; and the promotion of a state policy for digital transformation, understood as a cultural shift that encompasses changing mindsets to adapt to the digital world, organizational changes and process reengineering, and the deployment of the necessary infrastructure to enhance the digital ecosystem.

Of course, these goals must be understood within a comprehensive development plan, in conjunction with sustainable development goals, competitive markets, and the protection of human rights.

4.1 CYBERSECURITY

The development of AI systems creates better tools to combat cyberattacks, but it also opens windows of opportunity for cybercriminals by providing them with powerful new avenues for crime. Security is essential to building a trustworthy AI ecosystem.

4.1.1 Specific cybersecurity recommendations:

- Develop a regulatory framework for cybersecurity that addresses authentication access management, data privacy and protection, including public policy guidelines on its protection, sharing and processing, and that requires transparency and algorithmic explainability, applying the concept of transparency by design, monitoring and anomaly detection, bias assessment and mitigation, security throughout the AI development lifecycle, both for logical elements (software) and for equipment and infrastructure (hardware).
- Implement a single digital identity system operated by an independent body, with sufficient resources for continuous technological updating, in order to eliminate the proliferation of public and private personal and biometric databases.
- Create incentives to increase investment in cybersecurity research and development, both in government and in universities, research centers and private companies.
- Increase the country's participation in international cooperation mechanisms and international forums.

- Promote research, training, and professional development in the public and private sectors on the evolution of deanonymization techniques and offensive attacks, as well as other privacy-protecting technologies.
- Identify critical assets and services with specific prevention and detection strategies, and design reaction plans appropriate to different circumstances.
- Ensure that cybersecurity covers the entire AI lifecycle, the nine levels of technological maturity, and considers appropriate actions for the different instances where risks lie: equipment, programs, data, and users.
- Clearly differentiate between national security, which deals with protecting critical infrastructure and services, and citizen security. Develop clear protocols for how to manage risk in both contexts.
- Conduct citizen education campaigns to raise awareness about the cyber risks that everyone faces, explaining the damages and potential costs they may incur.
- Offer training and professional development to all actors in the digital ecosystem, as well as strengthen the level of specialization and ongoing training of experts and cyber police.
- Create educational campaigns to explain how AI can be used to improve cybersecurity, how the security of AI systems themselves can be improved, what ethical and privacy challenges arise in the context of cybersecurity with AI, and promote the use of machine learning algorithms to assess and predict cybersecurity risks.
- Promote a culture of transparency and compliance so that companies and public entities can share information about cyberattacks, learn about best practices and prevention and correction strategies, and strengthen system design.
- Propose economic incentives for small and medium-sized businesses to comply with cybersecurity standards and certifications and educate them about the benefits they gain from sharing information about cyberattacks.
- Publish clear and transparent protocols so that the public administration can act quickly and effectively in the event of an emergency. cyber episode and have specialized and properly trained teams.
- Use controlled regulatory experimentation spaces (sandboxes) to innovate in risk management, insisting in the formation of inclusive, multidisciplinary and diverse teams.
- Establish risk management and response protocols that prioritize human rights impacts.
- Allocate sufficient public budgets to keep systems up to date and have trained personnel so that public entities and services are cyber-secure and reliable.

4.2 ETHICS, RESPONSIBILITY, AND INCLUSION. AI IN THE PUBLIC INTEREST.

The ethical development of AI must be based on respect for the human rights of all population groups. This implies moving away from the technocentric model to focus on human beings, privileging the ethical and inclusive development of digital ecosystems, paying special attention to AI and GII, considering cultural differences and taking into account their environmental sustainability.

Public policies aimed at reducing digital violence against women and other vulnerable groups; eradicating the feminization of poverty and precariousness in the workplace; preventing the hypersexualization of women and girls through AI and AGI; avoiding workplace discrimination based on gender, age, ethnicity, religion, or ideology; eliminating historical biases; and closing the digital divide must be designed taking into account the rapid pace of change in the digital ecosystem. Without swift action, the dynamics of the digital ecosystem will continue to exacerbate all these ills due to its ability to amplify biases in a variety of ways.

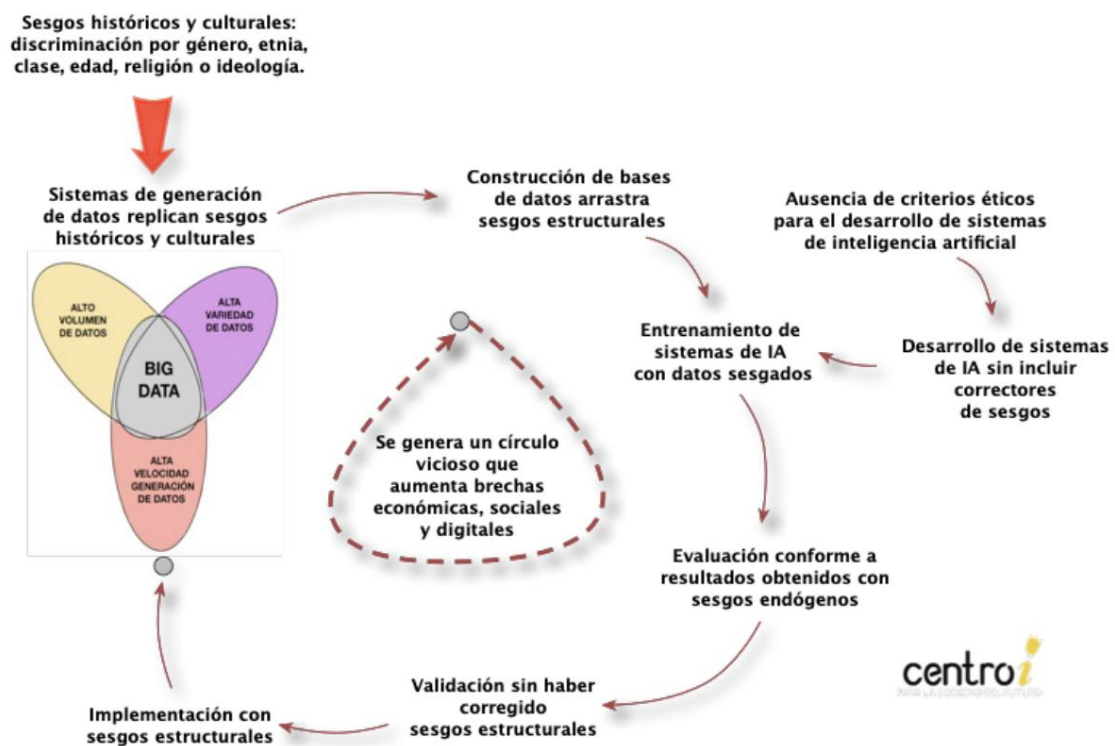
These policies do not have to start from scratch, but should take advantage of legal and regulatory frameworks, as well as institutions. existing.

Privacy and surveillance concerns have particularly serious implications for women in the context of harassment and digital violence. Therefore, the State must play a fundamental role in the creation and management of data, and when it comes to a gender perspective, in addition to the basic aspects of privacy, transparency, and traceability, its policies must take into account

One of its objectives is to ensure the representation of marginalized groups at all stages of the creation, training, and use of different types of AI, all with a systemic approach.

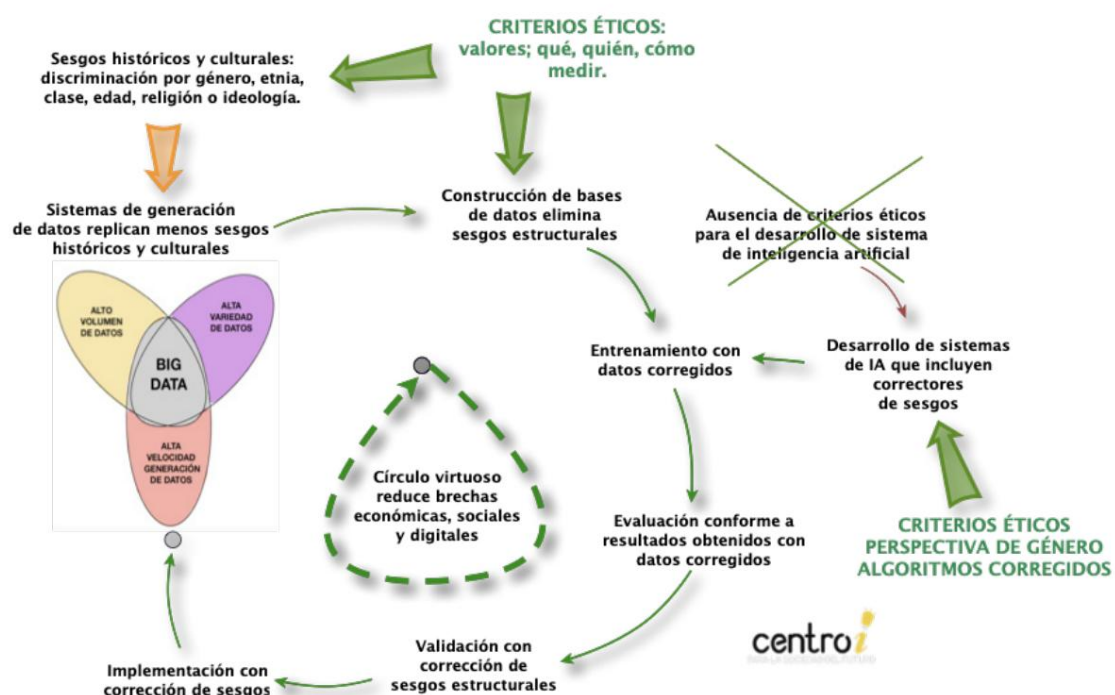
The following two diagrams show the vicious cycle of structural biases in the development of AI systems and the opportunities to break the vicious cycles that are generated throughout the life cycle.

Figure 16: Structural bias drag cycle in the development of artificial intelligence systems



Source: Centro-i for the Future Society. http://centroi.org/RAM-UNESCO_mapas_sistemicos_ia

Figure 17: Opportunities for bias correction in the data lifecycle



Source: Centro-i for the Society of the Future. http://centroi.org/RAM-UNESCO_mapas_sistemicos_ia

In general, when it comes to AI models developed or used by governments, the use of the UNESCO-published Ethical Impact Assessment Tool is recommended to assess the ethical impacts and risks of AI models.

4.3. EDUCATIONAL UPDATING AND JOB RETRAINING

The increasingly widespread use of AI and AI, automation, and robotization are redefining the way we work and the skills desired in different job profiles; they are creating new job profiles, modifying existing ones, and eventually eliminating others.

All industrial revolutions have generated these phenomena, but never with the speed brought about by the introduction of AI into the workplace. Reducing the costs of this transition requires state policy—that is, legal, regulatory, and public policy frameworks, including financing mechanisms, based on public-private collaboration, focused on the protection of human rights.

In the face of these phenomena, it is crucial to add to the review processes for educational plans the objective of improving coordination between curricular content and current and future work needs, so that the education system can respond quickly to changes in job profiles.

4.3.1 Specific recommendations for educational updating and job retraining:

- Design a state policy that involves the different branches and levels of government, the private and social sectors, and educational institutions to address the changes generated in labor markets by the emergence of AI and IAG.
- Ensure that the design of public policies aimed at addressing changes in labor demand is the result of collaborative work between governments, employers, and educational institutions at all levels, especially linking secondary and higher education, under an inclusive governance framework.
- Public policies that are defined must focus on people, considering the protection of human rights and focusing on the differential impacts caused by gender, age, and other factors.
- Include courses on soft or socio-emotional skills and the benefits of complementary work competencies in educational plans and programs to provide students with better tools for integrating into new ways of working. Consider topics such as resilience, communication, empathy, ethics, collaborative work, flexibility, and adaptability to prepare young people for an interconnected, highly competitive, and rapidly changing world.
- Design and deliver accelerated training programs, as well as skills expansion and retraining programs, for people already participating in the formal economy, including public servants, to keep them in their jobs or facilitate their reintegration into new roles.
- Design and deliver appropriate programs for people working in the informal economy, seeking new arrangements that guarantee labor rights for emerging forms of work and give them access to accelerated training, skills expansion, and reskilling programs.
- Allocate human, technological, and budgetary resources to teacher retraining in digital literacy and AI.
- Harness the potential of AI and IAG to improve learning plans and processes.
- Design policies aimed at reducing educational gaps and digital divides in rural areas or marginalized communities, taking into account the systemic requirements of the current situation, so as not to impose additional obligations on schools that barely have the resources to offer a traditional curriculum without first addressing technological infrastructure needs. Likewise, regional, local, cultural, linguistic, gender, age, ethnic, disability, and other differences should be taken into account.
- Expand the scope of the dual education model applied in Mexico to address the changes that AI has already begun to bring about in the definition of job profiles, transforming it into a transdisciplinary model that crosses the traditional barriers that separate technical disciplines and hard sciences on the one hand, and social sciences and humanities on the other.
- Insert humanistic subjects into the curricula of STEM programs and knowledge in AI and IAG vertically and horizontally at all educational levels and specialties.

- Update educational plans to improve coordination between curricular content and changes in labor demand profiles brought about by AI and AGI, with processes that allow for agile response to changes in labor demands.
- Leverage the momentum of updating educational curricula to transform traditional curricula by infusing critical and systemic thinking from basic education and continuing through all levels, helping all students understand, use, and question AI, including how to evaluate incoming information, identify biases, analyze data, and apply systemic thinking to improve their decision-making.
- Implement digital literacy and systems thinking programs for teachers at all levels, particularly primary and secondary schools, so they can transmit and teach the digital skills that will prepare students to live in a digital world.
- Design continuing education programs that leverage the potential of AI and AI, adapting them to the specific needs of different population groups, including adults and the elderly.

4.4. INFRASTRUCTURE

In a broad sense, and for the purpose of making AI easier to visualize, it can be said that AI is like the last layer, or at least the newest, of the internet, and that it is the technology that is driving the evolution and functioning of the digital ecosystem at speeds previously unimaginable.

The proper development of AI requires networks, large amounts of energy (and therefore a focus on addressing sustainability issues), data centers, and specialized equipment. Therefore, it is important that public AI policies include this matrix with all its components.

Digital transformation, which includes the development and deployment of infrastructure, must be a national priority that also considers state agencies for the adoption of AI, not only in the services they offer to citizens, but in all public sector work, particularly in cybersecurity and scientific research, where the role of public institutions is preponderant, as well as for improving decisions and the design of public policy.

4.4.1 Specific recommendations on infrastructure:

- Implement a state policy for the country's digital transformation, addressing it as a cultural change that encompasses all aspects of life in society.
- Align incentives to promote investment in basic telecommunications and internet infrastructure, computing, supercomputing, and data centers, opening up possibilities for using public-private partnership schemes, under principles of technological neutrality and competition.
- Promote the deployment and widespread access to basic infrastructure, prioritizing the needs of educational centers, captives, research and health services.
- Support the open data initiative "Abramos México," not only for open government purposes, but also for training data so that it can be used by both companies and public administrations.
- Promote data standardization and interoperability, considering the capacity and limits of systems.
- Promote the emergence of organizations dedicated to the assessment of compliance with ethics in AI.

The fundamental recommendations for developing systemic strategies to foster the ethical development of AI respond to new opportunities and present enormous challenges.

Given the scale of the challenges and risks that societies face with the evolution of AI and AGI, they must be addressed with state policies, simultaneously addressing various fronts and based on respect for the human rights of all population groups. This implies involving all levels of government and moving away from the technocentric model to focus on human beings, considering cultural differences and taking into account their environmental sustainability.

The ethical development of AI must be addressed through public policies that reflect international best practices and include objectives in such important areas as culture, education, work skills, scientific and technological capabilities, inclusion, gender gap reduction, and gender perspective. To this end, special attention must be paid to actions that break the cycle of structural biases in AI and GSI development.

Although Mexico has let several years pass without making major progress in AI governance, industry, academia, some public entities and local governments, as well as civil society organizations involved in this topic, have been taking various actions to promote its development. In recent months, renewed interest and the beginnings of collaboration and coordination of efforts have been observed. Therefore, the current moment is seen as an opportunity to create a new AI governance environment, where one of the main challenges will be to secure the strong support of the APF, which will materialize into a robust, yet flexible, regulatory and governance system based on collaboration.

Annexes

ANNEX 1

This annex includes the legislative initiatives and opinions on AI introduced in Congress. Their status within the legislative process varies, and most have not been approved.

Recommendations for the processing of personal data derived from the use of artificial intelligence, National Institute of Transparency and Access to Information (INAI), May 2022: <https://home.inai.org.mx/wp-content/documentos/DocumentosSectorPublico/RecomendacionesPDP-IA.pdf>

Opinion with a point of agreement to urge the Attorney General's Office to carry out the proper investigation and prosecution of crimes related to digital platforms known as adult content, as well as to urge the INAI to issue recommendations and guidance documents for the protection of personal data derived from the use of artificial intelligence, Senate, January 2023: https://infosen.senado.gob.mx/sgsp/gaceta/65/2/2023-01-24-1/assets/documentos/Dict_1ra_Plataformas_Digitales.pdf

Bill for the Ethical Regulation of Artificial Intelligence and Robotics, Parliamentary Gazette of the Senate of the Republic, May 2023: https://www.senado.gob.mx/65/gaceta_comision_permanente/documento/135000

Initiative to modify some paragraphs of the General Law on Women's Access to a Life Free of Violence and an article of the Federal Penal Code, July 2023: https://infosen.senado.gob.mx/sgsp/gaceta/65/2/2023-07-25-1/assets/documentos/Inic_PRI_Dip_Estefania_Vargas_art_20_199_CPF.pdf

Initiative to reform Article 199 Octies of the Federal Penal Code, Chamber of Deputies, July 2023: https://infosen.senado.gob.mx/sgsp/gaceta/65/2/2023-07-18-1/assets/documentos/Inic_PRI_Dip_Sayonara_Vargas_art_199_inteligencia_artificial.pdf

Initiative to reform article 20 of the General Law on Women's Access to a Life Free of Violence, as well as article 199 of the Federal Penal Code, Chamber of Deputies, July 2023: http://sil.gobernacion.gob.mx/Archivos/Documentos/2023/07/asun_4586645_20230725_1690299062.pdf

Initiative with draft decree that reforms and adds various provisions to the General Health Law, Chamber of Deputies, August 2023: <https://comunicacionsocial.diputados.gob.mx/index.php/boletines/impulsan-iniciativa-para-regular-uso-de-inteligencia-artificial-en-el-sistema-nacional-de-salud>

Bill to amend and add articles 5, 6, and 7 of the Law creating the Mexican State News Agency, to include the issue of liability for the use of artificial intelligence, Chamber of Deputies, September 2023: <http://gaceta.diputados.gob.mx/Gaceta/65/2023/sep/20230912-IV-3.html#Iniciativa6>

Initiative with draft decree amending section XVII of article 73 of the Political Constitution of the United Mexican States, to empower the Congress of the Union to issue the necessary regulations to regulate the research, development and applications of artificial intelligence, Senate, September 2023: https://infosen.senado.gob.mx/sgsp/gaceta/65/3/2023-09-06-1/assets/documentos/Inic_PT_Sens_Artificial_Intelligence.pdf

Constitutional reform initiative that proposes to reform Article 73 of the Constitution to empower the Congress of the Union to enact laws on artificial intelligence and its applications, cybersecurity, and neuro-rights, Senate, September 2023: https://www.senado.gob.mx/65/senate_gaceta/document/137999

Initiative to reform and add Chapter VII Bis to Title Eight, and Article 200 of the Federal Penal Code, to regulate new technologies for the purpose of creating lewd content with real or generated victims. It also adds a Chapter VIII BIS "On technological activities that violate the dignity of people" and proposes increasing the penalty provided for in Article 200 of the Federal Penal Code to establish a greater sanction for those who engage in these behaviors, leaving 8 to 10 years in prison, Senate, September 2023: https://infosen.senado.gob.mx/sgsp/gaceta/65/3/2023-09-13-1/assets/documentos/Inic_Morena_Sen_Olga_Cordeo_Materia_Regulacion_de_las_Nuevas_Tecnologias.pdf

Initiative with draft decree adding Chapter III to Title Seven Bis called "Violation of Sexual Privacy through Artificial Intelligence" to the Federal Penal Code, Senate, September 2023: https://infosen.senado.gob.mx/sgsp/gaceta/65/2/2023-06-28-1/assets/documentos/PA_PAN_Dip_Mariana_Gomez_IA_en_Seguridad.pdf

Initiative to reform Articles 30 and 70 of the General Education Law and 7 of the General Law on Higher Education, Chamber of Deputies, October 2023: <http://gaceta.diputados.gob.mx/Gaceta/65/2023/oct/20231004-III-1.html#Iniciativa2>

Initiative with draft decree of the Law of the Mexican Agency for the Development of Artificial Intelligence, Chamber of Deputies, October 2023: <http://gaceta.diputados.gob.mx/PDF/65/2023/oct/20231011-II-3-1.pdf>

Initiative to reform articles 202, 199 Septies of the Federal Penal Code, Chamber of Deputies, October 2023: <http://gaceta.diputados.gob.mx/Gaceta/65/2023/oct/20231010-III-1.html#Iniciativa7>

Initiative to reform articles of the Federal Telecommunications and Broadcasting Law to establish a mechanism for monitoring and supervising artificial intelligence systems used in telecommunications services, Senate, November 2023: https://infosen.senado.gob.mx/sgsp/gaceta/65/3/2023-11-08-1/assets/documentos/Ini_Morena_Sen_Lucia_Trasvina_Regulacion_de_Sistemas_de_IA.pdf

ANNEX 2

Regarding STEM skills, there are numerous public, federal, local, and private programs in Mexico to promote diversity in STEM. Examples include the following:

- The Ministry of Economy, together with the STEM Movement, the Ministry of Public Education, UN Women, the Siemens Foundation and the Inclusion and Diversity Commission of the Business Coordinating Council, launched the Modo STEM initiative in 2022, which "seeks to develop a national awareness-raising strategy to coordinate actions by various institutional and social actors to encourage the participation of more adolescent and young women in STEM-related careers."¹⁹³
- Grow with Google for Women in STEM, a 14-week program for women in STEM careers interested in joining the cloud computing work world, with live virtual classes.¹⁹⁴
- Since 2019, Iberdrola México has been implementing the STEM Boost program, in conjunction with the Universidad de los Valles Centrales de Oaxaca (UTVCO), STEM for Kids, and the UNAM Renewable Energy Institute (IER), to encourage students, primarily women, to study these disciplines. By 2022, 58 university scholarships had been awarded, and 120 teachers had been trained, impacting more than 2,000 students and teachers.
- STEM Instructional Framework, an academic program launched by the public initiative MéxicoX and [aprende.MX](https://aprende.mx), with a duration of 40 hours, with the objective of "promoting entrepreneurship, innovation, as well as the careers and jobs of the future, encouraging teamwork and inclusion, developing the essential skills so that teachers of basic and upper secondary education can mainstream the gender perspective in their practice through learning based on problem-solving and design thinking", among its results it seeks to promote STEM education as a pillar for sustainable development and social well-being.¹⁹⁶
- RobotiX in the box (RIB) and FIRST LEGO League (FLL) are two programs promoted by Robotix, FIRST LEGO League Mexico (non-profit foundation) and 28 State Education Secretariats to promote the STEM skills of boys and girls from more than 1,500 schools during the 2023-2024 school year.¹⁹⁷

Other examples of programs are:

- In the state of Coahuila, NiñaSTEM¹⁹⁸ supports women in primary and secondary education. In partnership with the OECD, the Coahuila government and local education authorities are promoting a mentoring network of successful women in this field to foster STEM education for girls and young women.
- In Nuevo León, the Institute for Innovation and Technology Transfer (I2T2) has the Tecnolochicas Nuevo León program to promote the presence of women in scientific and technological careers. The plan, implemented since 2019 with the support of the Ministry of Education and the UANL, includes the participation of various state agencies to reach more than 3,000 female students trained in the development of technological skills.¹⁹⁹

¹⁹³ Ministry of Economy, 2022. Blog. The Ministry of Economy presents the Modo STEM Mx Initiative. Published on August 24, 2022 in <https://www.gob.mx/se/es/articulos/la-secretaria-de-economia-presenta-la-iniciativa-modo-stem-mx-312291>

¹⁹⁴ Parcerisa, Ch. (2023). Google. Bridging the Gender Gap in Technology: A Matter of Community Building. Published in: <https://blog.google/intl/en-419/company-news/initiatives/narrowing-the-gender-gap-in-technology-is-a-matter-of-building-community/>

¹⁹⁵ Iberdrola. (2022). Diversity and Inclusion Report 2022. https://www.iberdrolamexico.com/wp-content/uploads/2023/07/Informe_Diversity_and_Inclusion_2023.pdf

¹⁹⁶ MexicoX. (2023). STEM Instructional Framework. https://mexicox.gob.mx/courses/course-v1:STEAM+MAIS23071X+2023_08/about

¹⁹⁷ Robotix. (2023). Synergy between the public and private sectors encourages more than 1,500 schools to incorporate STEM programs in this return to school season. <https://www.soyrobotix.com/sinergia-entre-sector-publico-y-privado-impulsa-que-mas-de-1500-escuelas-incorporen-programas-stem-en-este-regreso-a-clases/>

¹⁹⁸ Coahuila State Education Secretariat. Niñastem. <https://www.seducoahuila.gob.mx/ninastem/> ¹⁹⁹

Government of Nuevo León (2022). State promotes Tecnolochicas Nuevo León program. <https://www.nl.gob.mx/boletines-comunicados-y-avisos/> State promotes tech program for girls in Nuevo Leon

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